OVERSEAS EDITION
NOVEMBER 1954

McGRAW-HILL DIGEST

INTERNATIONAL BUSINESS AND INDUSTRY

NEW-PRODUCT FAILURES occur too often. A sound marketing program can mean success and better profits p11

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PLASTER CASTING the light metals with a new technique widens the range of parts that can be cast. Finish and tolerances are superior p36

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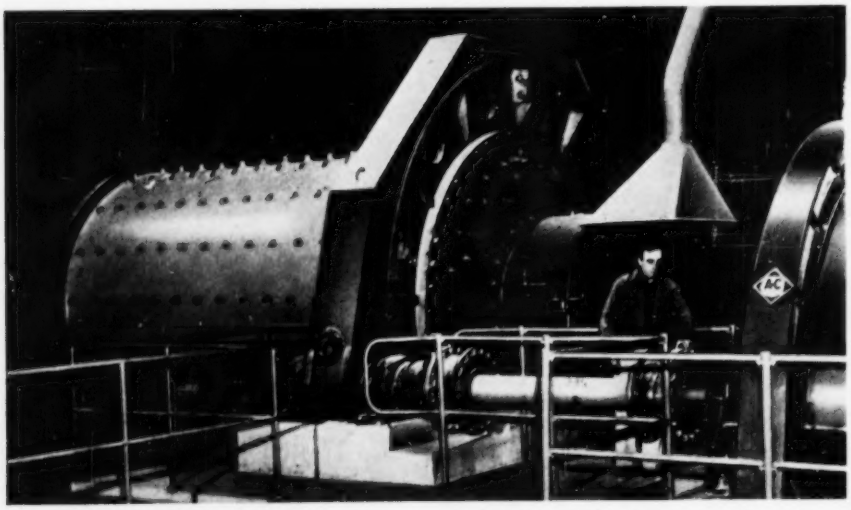

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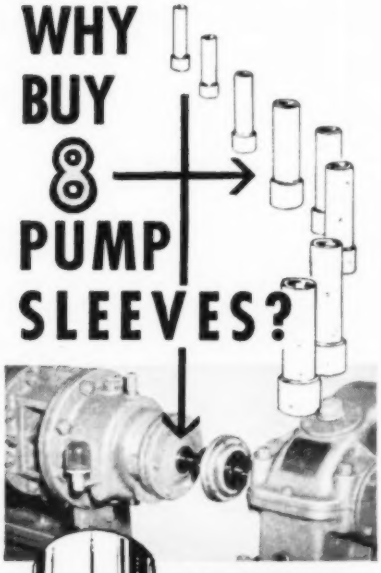

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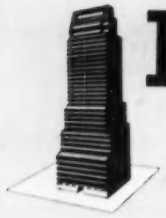

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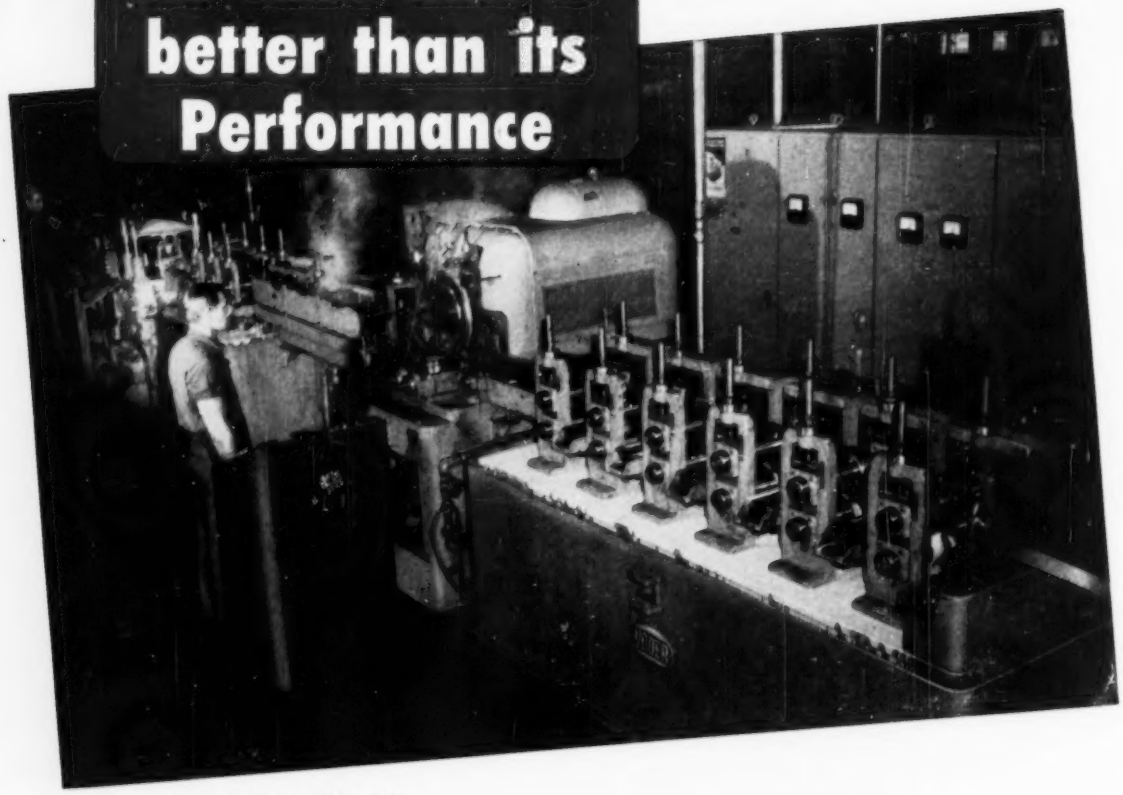

Above: One out of three Yoder Tube Mills at Standard Steel Spring Co., Trenton, N. J. and Los Angeles, Cal.

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BUSINESS TRENDS

THE FORESEEABLE OUTLOOK for U. S. business, and for world peace, is good. That's the judgment of the Eisenhower Administration, reflected in its sharply revised 1954–55 budget estimates.

Cause of the revision is falling revenues—now put at $59.3-billion, or $3.4-billion below original estimates—due to tax cuts and the recent recession. Here's how Eisenhower met the drop:

• **Defense Spending.** This was cut $3-billion (including $1-billion for foreign military aid). Every department suffered except stockpiling, which rose $300-million to include increased lead and zinc purchases (McG-H Digest, Oct, p9). The further cut in defense outgo—now $8.4-billion under the Korean peak—means the Administration rates war prospects low.

• **Nondefense Spending.** This rose $1.4-billion because of bigger outlays for housing, shipbuilding, farm price supports, etc.—some of them automatic under existing laws. But even allowing for these, total outgo will drop $1.6-billion to $64-billion. The significance: the Administration felt it could safely cut net spending without imperiling business, now pointed for an upturn.

The estimated 1954–55 deficit, incidentally, is now $4.7-billion—up $1.8-billion over January estimates and highest of the Eisenhower term. The Administration still hopes this can be cut. Its best bet: business buoyancy, higher tax intake.

RED-HOT COMPETITION for the first time since the war has produced a flood of ingenious U. S. retailing ideas. They range from spectacular clearance sales to give-aways of all kinds.

"Salethons," or 24-hour warehouse sales starting at 6 p. m., were staged by a Washington, D. C., radio and TV firm; besides prizes, inducements included prices that dropped every hour . . . Another firm offered free bus rides to its warehouse.

Gift lures include $25 savings bonds, $100 gift certificates redeemable in goods (with every purchase of $300 or more), and free 5-day vacations (with every purchase of a home freezer or cooking range) . . . A Cleveland supermarket gave away $8,000 in prizes to customers who were checking out when a special bell rang.

But the biggest idea merchants have been automobile dealers trying to unload their last 1954 cars before the advent of 1955 models. They have offered discounts up to $1,000, vacations, sky-high trade-in values, free mink stoles, even two cars for the price of one. Example: A free British-built Anglia Ford with every Lincoln purchased.

BIGGEST MYSTERY in U. S. metal markets is mercury's meteoric rise to a record $330 per 76-lb. flask—almost double the end-1953 price and five times 1950's. The rise belies a market situation in which output and imports (together about 110,000 flasks annually) far exceed known consumption.

In the face of Defense Department silence, observers offer the following clues and conclusions:

Clues: (1) After quitting Defense Department's critical list last year, mercury (quicksilver) was restored last March and put under export control in June; (2) in July, U. S. announced it would buy 200,000 flasks of domestic and Mexican mercury at $225 per flask during the next 3½ years (thereby establishing a price floor and encouraging output in U. S. mines). But this alone cannot explain insatiable demand that has pushed the price far above the government's official bid.

Conclusions: (1) The secret premium-price buyer is the U. S.; (2) it needs mercury for an urgent defense purpose, possibly connected with atomic energy, guided missiles, or something new.

COLOR TELEVISION will boom in the U. S.—but not yet. The industry this year got off to a false start, stumbled, then changed pace.

• **First attempts** to sell expensive, small-screen sets this year failed. People refused to pay $1,000 for 12- or 15-in. screens while programming stayed limited and bigger, cheaper sets loomed ahead. One big firm slashed prices 50%.

• **New, sounder policy** aims at larger sets, with 19- or 21-in. screens, produced in sufficient quantity to assure reasonable price. But production and cost problems are still formidable. Output of such sets, priced around $800 to $900, may reach only 30,000 this year.

• **Even in 1955,** output may be only 300,000 sets or less. As for the "ideal" $500 price, guesses range from 18 months and up as to when it will be achieved.

• **Black-and-white TV** meanwhile bustles along. Output this year will beat 1953's 6.4-billion sets. But color's shadow keeps prices low ($150–300) and has killed demand for big elaborate consoles. Consensus is that monochrome will survive many years on a price-competitive basis.

But color TV will eventually boom. Here are the latest long-range estimates of U. S. set ownership: by 1957, 7½-million sets; by 1964, 37½-million.

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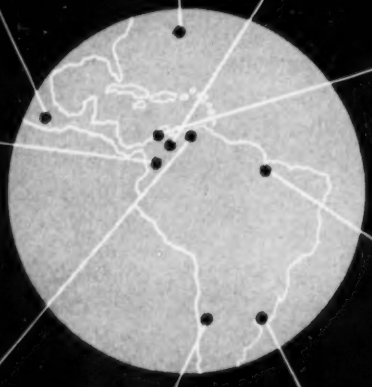

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INTERNATIONAL TRENDS

WASHINGTON—Convertibility is off for at least 2 years. That's the main significance of the recent joint International Monetary Fund and World Bank meeting here. The chief reasons:

British Political Uncertainty. This would make convertibility risky. An election may come next year, must come the year after. The Labor Party is almost as opposed to convertibility as it is to denationalization of major industries. It probably would restore monetary controls if it returned to power. This prospect could touch off a run on the pound if it were made convertible before the election.

U. S. Tariff Uncertainty. This is making Britain—and other countries too—go slowly on freeing their currencies. After the boost in U. S. watch tariffs, they are now waiting to see if the Administration really will succeed in pushing its trade liberalization program through Congress.

U. S. Export Policy. Recent U. S. moves to subsidize exports are creating concern abroad. Such things as the new program to dispose of farm surpluses abroad (McG-H Digest, Aug, p9), the Export-Import Bank's drive to expand exporter credits, and the increasing use of foreign aid to boost exports—all tend to reopen the dollar gap.

A general trend toward this sort of economic nationalism was noted at the Washington meeting. Eugene R. Black, World Bank President, criticized the increasing use of government credit, insurance, and subsidies to exporters by a number of countries.

This hampers efficient development of underdeveloped countries by over-extending their borrowing for nonessential imports and limiting their credit-worthiness for long-term development loans. And it could lead to a competitive export war that could destroy the delicate structure of international economic cooperation.

Progress toward freeing world trade and payments will not stop, of course, just because convertibility is delayed. World dollar reserves are too high for that. Britain will push ahead with administrative relaxation of controls, particularly those aimed at dollar imports.

The emphasis will be on a slow advance on both the trade and monetary fronts rather than on dramatic moves toward convertibility. *De facto* convertibility may eventually result, but key countries will retain their right to reimpose controls to shelter their domestic economies.

NEW DELHI—India's drive for steel is becoming increasingly international. Basic goal is four or five big plants averaging 500,000-ton capacity apiece. Two—Tata and Indian Iron & Steel—are now in existence; a third will be built for the government by Krupps and Demag (McG-H Digest, Sept, p9); the fourth and fifth may be part of the second 5-year plan beginning in 1956.

British capital may participate. Indian businessmen, including the big Birla interests, are understood to be sounding out London financial houses now on possibilities of a joint private deal.

But the biggest surprise is Russia's offer, accepted by India "in principle," to supply and build a giant plant to be paid for by India in 10 years on easy terms. Russians asked no management or capital share.

Observers now wonder where propaganda and realism begin and end in the Russian offer. In view of the Soviet industrialization drive, the offer to export a great steel plant is alone surprising. Also, if Russia has one for export on easy credit, many surmise that China would have seemed a likelier customer than India.

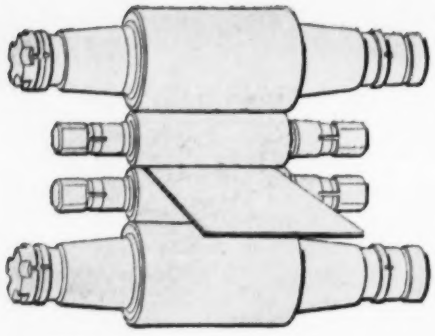
Whatever the outcome, it should supply a significant pointer to Russian politico-economic policies. One theory: Moscow now seeks to aid key free backward areas to counter U. S. influence.

LONDON—This city may be the first capital to benefit from the world's latest industrial wonder: seaborne liquefied natural gas. Plans are already under study for using Middle East gas, now being wasted at a rate of 500-million cu. ft. daily, to boost London's power fuel cheaply.

The project, paradoxically, is of U. S. origin. Its chief architect is Carl Flesher, of the World Bank, Washington, whose research indicates that Middle East gas could be laid down in London at half the cost of British coal gas.

Practical support for these calculations has been received from another American pioneer, W. L. Morrison, who has built special insulated barges to ship liquefied gas (at −258°F) from the Gulf of Mexico, and possibly Mexico and Venezuela, up the Mississippi to Chicago (McG-H Digest, June, p35). There it will be used to generate power and, during vaporization, as refrigeration.

Now three British experts, with government support, are studying the project in the U. S. Besides liquefaction and transportation techniques, they are looking into another vital angle: underground liquefied gas storage.



ROLLS
Recent technological improvements combined with 80 years experience in roll making assure quality rolls—for ferrous and non-ferrous mills.

Anywhere there's industry you'll find BLAW-KNOX

Throughout the world we have helped many companies improve production and profits through our (1) engineering know-how that includes an intimate understanding of world-wide industry . . . and (2) engineered products that are designed and built to meet individual customer requirements.

Here, for example, are some of the Blaw-Knox products that have contributed to world-wide industrial progress and development.

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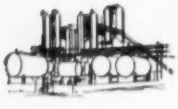
ROLLING MILLS
Rolling mills and auxiliary machinery for rolling ferrous and non-ferrous metals to shape and specification.

SPRINKLER SYSTEMS
Sprinkler systems engineered to protect against any type of fire hazard in all types of structures.



CHEMICAL PLANTS
Engineers and constructors of chemical, petrochemical, petroleum and atomic energy plants.

PROCESS EQUIPMENT
Engineering and manufacturing facilities for fabrication of standard equipment or development of units to customer specifications for the chemical, food and dairy industries.

STEEL GRATING
Safe footing provided by rigid one-piece ELECTROFORGED® construction and non-slip twisted crossbars—for floors, platforms, walkways, stair treads and many other uses, both indoors and outdoors.

POWER PIPING
Complete prefabricated power piping systems for all pressures and temperatures plus a complete line of pipe hangers and vibration eliminators.

CONSTRUCTION INDUSTRY

BATCHING PLANTS
Bins, batching plants, truck mixer loading plants, and central mixing plants for concrete construction—in many sizes and variations for both fixed and portable installations.

CLAMSHELL BUCKETS
Wide range of types and sizes for every kind of digging and rehandling. Built to withstand the severest working conditions.

SUBGRADER, SPREADER, FINISHER
These three machines work as a team—giving final preparation to the road bed, spreading the concrete evenly and finishing the surface—on concrete roads and airports.

TRUKMIXERS
Excel in high yardage production and trouble-free performance. Revolving hopper eliminates many costly delays often caused by wear, leakage and seal failures.

ADNUN BLACK TOP PAVER
Accurately lays hot or cold asphaltic mixes, sand, cinder, slag, soil, cement, chips and stone—for bituminous roads and airports.

MULTI-FOOTE CONCRETE ROAD PAVER
Anyone who drives a truck can handle these big, fast mixers. Large 34 E Duomix double-drum model delivers 34 cu. ft. of mix every 35 seconds. 27 E and 34 E Single Mix have same strong, simple construction.

For further information on Blaw-Knox products and services, just write or wire our Export Department.

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NOVEMBER 1954
VOLUME 9 • NUMBER 11

Mc GRAW-HILL
DIGEST

Management Looks at a New Product and Asks These Questions:

Market Opportunity: Is the product needed? How big is the market and who will buy? Is it a growing or declining market? Will the market last? How much of the market can be sold? What do consumers think of the product?

Competition: Is it a crowded field? Can the product compete successfully? Is it likely to inspire a new competitive item? Does it have features that will overcome any competition?

Production: Does the product have the right design from a cost and production viewpoint? Are new plant facilities available or can new-product manufacturing be integrated into present facilities?

Distribution: Does product fit existing distribution pattern? Can product be distributed through regular channels? Are any changes necessary in the sales force? What do dealers think of the product? How much advertising and promotion is necessary?

An Original Digest Article

Getting Your Product to Sell

IT'S A STARTLING STATISTIC but nevertheless true: less than 20% of the new products reaching the U. S. market are successful from both a marketing and a profit viewpoint. Reasons for this appalling showing vary from inferior product design to a lack of understanding of why people buy.

Marketing, in simple terms, means getting your product into a position where it can be sold successfully at a profit. But marketing problems vary throughout the world. So no single ideal program is going to give you all the answers. We have assembled the basic rules for setting up a sound marketing program. Your job is to take those basic rules that apply to your particular problem and turn them into a marketing program that will assure success with your new product.

Getting a new product on the market can usually be broken down into five stages: (1) product testing, (2) project review, (3) campaign planning, (4) test marketing, and (5) national distribution. These are the main points. A close look reveals their details:

1. PRODUCT TESTING—One important feature of this phase is that probable failures can be eliminated with little cost. Testing also reveals possible product changes that can lead to a better product with a wider market. Changes would overcome consumer objections, increase the product's uses, or increase sales appeal. In addition, testing is likely to give you an idea of the demand for the product in commercial quantities.

There's this caution in product testing: it can take a long time, depending on the product. Some products can be tested quickly with relatively small samples. Others, particularly heavy industrial equipment, may require many tests running into a year or more.

You can get information on how your new product shapes up from these groups: consumers, testing laboratories, dealers and distributors, trade and professional people. The most important source of information is the consumer group. And if your product is designed for a specific consumer application, consumers are the best source.

Testing laboratories report on the performance and quality of a product. Where extensive tests with elaborate equipment are needed, independent laboratories provide the most convenient and inexpensive information source.

Dealers and distributors are helpful in determining trade reaction to the new product. Their experience often allows them to make reliable estimates of the need for and the salability of the product.

Trade and professional people are also in a position to evaluate product possibilities. Trade shows are another good source of information on a product's acceptability. One manufacturer of consumer products displays prototype models of its new products at an annual trade show. The reactions and comments of buyers are carefully noted and the information

How To Develop Better New Products

In May the Digest featured an article on new-product research and development. The present story takes the new product from that stage to its final stage: marketing. Some highlights of the May article:

"Businessmen feel that new products, or redesigned old ones, hold part of the answer to increasing sales.

"A sound product-development program can insure your company's future—new and better products will always be ready for marketing."

"If you make consumer products, the key to planning new products is finding out what consumers want, then giving it to them."

thus obtained is used to measure the attractiveness of the new products.

The Worthington Corp. provides a good example of how a company turning out industrial equipment tests its new products. Pilot models of the new product are put through accelerated wear tests and other performance tests.

Then, if the product passes its tests satisfactorily, it is placed in operation at selected customers' sites for actual use tests. Two factors determine the trial-installation test site: (1) customer cooperation and (2) the test must be representative in terms of the proposed application for the product.

These tests provide two types of information. First, the customers report on the performance characteristics of the product on the job. Second, the piece of equipment is removed and taken back to the laboratories where it is inspected for wear and damage.

In the consumer field, product testing takes about the same form as in the industrial field. A cosmetic manufacturer tests its products this way: Informal tests are made among the company's office staff and associates. No attempt is made to select a balanced panel. Such tests rarely indicate how good the product is from a merchandising viewpoint but quickly bring out any basic faults.

If basic faults are discovered, the product is returned to the laboratory for further development. Then it is retested. If no basic faults are revealed, the product is turned over to the company's research department for further testing.

An extensive consumer panel makes the final tests. Samples are sent to the panel, together with questionnaires on which the users can report their opinions. If results are satisfactory, the product is approved by management.

2. PROJECT REVIEW—During this stage, management usually reviews the entire project from the viewpoint of marketability and profit possibilities. In some respects, this review parallels that made during the initial evaluation of the product idea. At this point, however, sales and cost estimates are much more accurate and test results are available showing the advantages and limitations.

Management, in its review, is concerned with all aspects of the product's cost structure and profit possibilities. The impact of the new product on both the company and the market is considered. An over-all picture of the product's possibilities results. If the review is favorable, management authorizes either the development of sales plans or the introduction of the product.

The final step is deciding when to enter the market. Many companies introduce new items whenever the product is ready. Others time their introduction with one or more of these factors in mind:

- General business conditions.
- Availability of production facilities and initial inventory of product.
- Competitive activity.
- Completion of consumer and market tests.
- Timing of seasonal items, including both buyers' and consumers' practices in purchasing such products.

This difference in approach often results from the nature of the product. Timing is not too important where the product is developed for a definite need in a well-defined year-round market. If the product has a seasonal sales pattern, timing is important.

3. CAMPAIGN PLANNING—With the start of campaign planning, the new product becomes an operating problem for your entire staff. But, to a great extent, planning activity centers with marketing specialists.

First step in campaign planning is to set the target introduction date, develop a planning timetable, and outline to the responsible individuals what is required at each step, and also the date their job should be finished. The planning timetable is generally established by working backwards from the target introduction date and determining when each preliminary step must be completed.

Well-chosen brand names for both industrial and consumer products provide definite help in introducing a new product. What is wanted is a word that can be easily identified with the product and will favorably influence product sales. Names that describe the product and suggest its uses are preferred.

Three types of tests apply to proposed product names: (1) association tests to determine what representative consumers associate the name with, (2) remembrance tests, and (3) preference tests, where a representative sampling of consumers are asked to state their purchase preferences based on product name alone.

Package design varies with the extent that the package influences buying decisions. Company policy in many cases dictates the general nature and design of packages. Some firms maintain similarity in the packages for all products in a line to obtain the advantages of standardization and mass display. Other companies design special packages for each product to build up the sales appeal of the individual package.

More and more companies test proposed packages with consumers before final adoption. Sample packages, made up for the tests, are shown to consumers. Their

preferences determine the final package for the product.

A sales forecast is needed as a basis for setting up sales and promotion budgets and planning production. The most common method of forecasting new-product sales is the sales-force composite. In this method, the company questions headquarters sales executives and industry specialists, district managers, and territorial salesmen as to probable sales of the new product. The forecast would then be made from these individual estimates.

The customer-estimate method is similar to the sales-force estimate method. With many products, you can get a fairly accurate estimate of customer needs and purchases through direct inquiry. Their answers, combined with the opinions of wholesalers and dealers, provide the sales forecast.

Final step in campaign planning is the development of sales and advertising campaigns for the new product. Over-all sales and advertising budgets are usually determined first. The total budget is then broken down into expenditures for individual purposes.

4. TEST MARKETING — The primary purpose of test marketing is to obtain as much additional information as possible regarding the product's markets and marketability. It is the last check point prior to full-scale introduction. Even at this late stage, you may find it more economical to abandon a product with poor sales prospects than to risk the expense of an unsuccessful marketing campaign.

Test marketing a new product involves three steps:

- Suitable test markets are selected.
- A full-scale introductory campaign is conducted in the test areas.
- Consumer and dealer surveys are conducted to measure the effectiveness of the campaign and to discover possible improvements.

The nature of the product or the size of the introductory campaign can limit the value of test marketing. Many industrial-product manufacturers are unable to test-market new products because of the limited number of buyers involved or because the size of the introductory campaign is limited.

If you are in the consumer-goods field, test marketing is a helpful tool in estimating the effectiveness of a proposed campaign. But it has one drawback. Competitors can introduce the product nationally while you are still test-marketing.

Test marketing can be complex and time-consuming when applied to major new products. One consumer-goods company had its program last 3 years. The program included two surveys in 6 months of potential users. The first survey determined whether potential users were favorably or unfavorably disposed toward the product. The second survey measured the change in potential consumers' attitudes caused by advertising and promotion in the period between the two surveys.

Other phases of the program covered reactions of actual purchasers of the new product. Interviews were conducted by mail and personal contact.

5. NATIONAL INTRODUCTION—This is the final stage. The new product has passed through the cycle of idea evaluation, laboratory development, and market planning. You face two major problems in this stage:

- Maximum impact of the product on the market demands careful planning and coordination of all elements.
- The enthusiasm and acceptance of dealers and customers will have to be aroused.

Sales tend to boom following announcement of the product's availability. But this is mostly the result of pipeline filling and is usually followed by a slump while the original stocks are being consumed.

During this slump companies tend to become discouraged with sales results and in many cases abandon the product. This is the time to inject a relatively small amount of capital into the project. It could assure the product's success.

If you intend marketing your product internationally, your program will need a few minor changes. Most of them will occur in the product-testing, campaign-planning, and test-marketing phases.

New-Product Failures

Here are the sad stories of two new products that died. Both should have lived.

METERING UNIT — A unique new line of electronic-metering devices drew much interest when first introduced. In 3 months, 2,000 inquiries were received. After screening, they were sent to sales representatives for follow-up. A field check, 2 months later, disclosed that in every sales area no sales developed that were attributable to inquiries. Within the year, the items were off the market entirely.

Why It Failed—Investigation showed that sales representatives had not been thoroughly trained in the application and importance of the device to industry. As a result, they could not exploit the leads given them.

ALCOHOLIC BEVERAGE —A European bottled a beverage, which Americans visiting his country thought quite good and urged him to distribute in the U.S. The product had to be served cold, but not iced. And it was distinguished by the fact that it was sold in a tall, tapering bottle almost 18 in. high. Unable to resist the opportunity, the European visited the U.S., set up a sales agency, began promoting his product. Thousands of bottles were bought for home use, but soon after the original impetus, sales dwindled almost to the vanishing point. Eventually exportation was stopped.

Why It Failed—Size and shape of the bottle made it completely impractical for use in American refrigerators. It was not the type of beverage that would be consumed in one sitting. Rechilling it for serving on another occasion caused a deterioration in flavor. Consumer research would have disclosed this.

- Know the duties and delegated responsibilities of your job so there can be no question in your mind of what you're supposed to do
- Find out what your superior needs to know about the decisions you make and the actions you take so he can report on to his superiors
- Report fully on long-term progress, job completion, deviation from schedule, and anticipated problems because, as a rule, they are . . .

What the Boss Wants to Know

MUCH OF WHAT WE PUBLISH on employer-employee relations tells management how to deal with employees. This article will reverse the usual pattern and tell the supervisor or employee what he should do for his superior. But before you mark this article as required reading and pass it on to your subordinates, perhaps you should scan it for some ideas on how to improve relations between you and your superior.

A cardinal rule to follow in getting along with your superior (let's call him the "boss") is this: never let your boss be surprised. This means that he should hear first from you about your successes or mistakes before he stumbles on them himself or hears of them through rumors. Much of your success will depend on keeping your boss informed.

To do your job successfully and to keep your superior informed require that you:

- Acquire a thorough knowledge of your job.
- Understand the needs of your superior.
- Understand your superior himself.

Doing this is not as simple as it sounds. First, let's look at your job. Its responsibilities as to keeping your boss informed certainly do not include your trying to substitute for the daily newspaper or business magazine on world events or general economic conditions. Nor should you be expected to pass on to him the rumors or gossip within your organization. But it is your responsibility to see that he recognizes the duties and responsibilities that have been assigned to you.

Now is a good time to review what authority and responsibility have been delegated to you. Some matters have been delegated to you completely and you have the entire responsibility for carrying them on; usually no report need be made to your superior on these matters.

But most matters are delegated for action on your part—but with the expectation that you will report your actions to your superior. These reports, no matter how or when they are made, should be regarded as an essential requirement of your job. Exceptional decisions or actions, of course, should be reported promptly.

A third degree of delegation is the implied delegation of authority and responsibility to make recommendations on any matter that affects the operations of your job, department, even the company as a whole.

After you review your responsibilities, both direct and implied, you can then determine what information should be passed on to your superior. He needs to know what decisions you have made, what actions you have taken. He, in turn, will have to report to his superior on his decisions and include, as his decisions, the ones you have made.

As a rule, your boss is responsible for your decisions and actions and must account for them. Executives report to company officers, officers to the board of directors, and the board to the stockholders.

You may ask now just what should be reported to the boss. That will vary according to your organization, job, and boss. Usually four main categories will cover needed reports.

1. Progress on long-term projects. Keep your superior informed on what's going on by periodic progress reports. He may need daily reports on some items. Others may be properly covered by weekly, monthly, quarterly, and even annual reports. Ask him when he wants reports as he may have to report periodically at conferences.

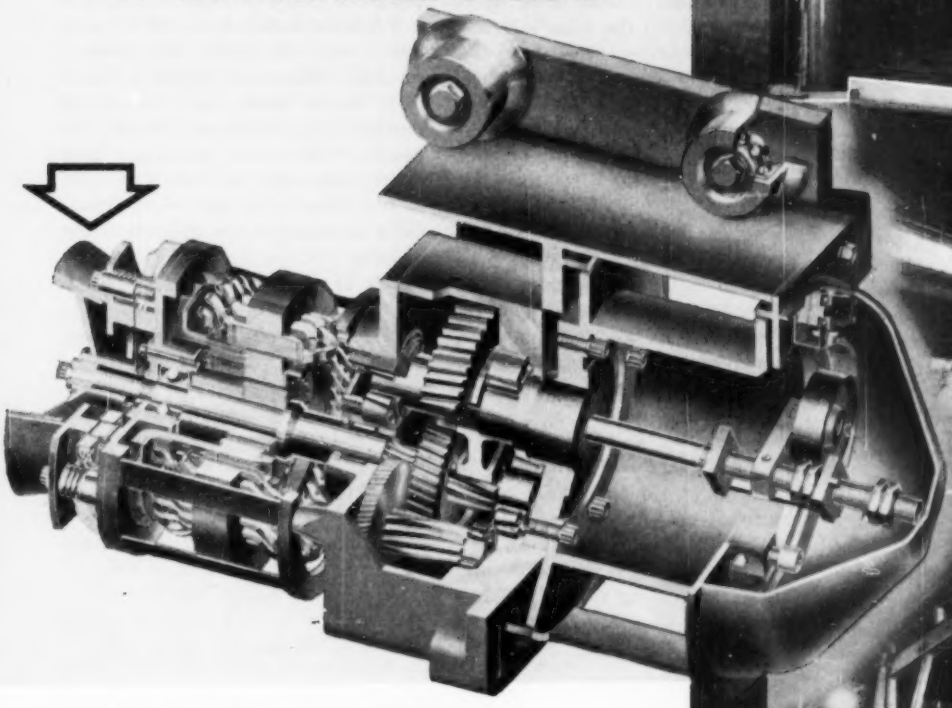
2. Completion of assignments. It's always a good idea to let your boss know when specific jobs or assignments have been finished. If you do not tell him, he can only assume that you haven't finished them. Most executives have learned through bitter experience that it's unwise to assume that a job has been done just because someone was told to do it. Besides you cannot get credit for a good job if no one knows you've done it.

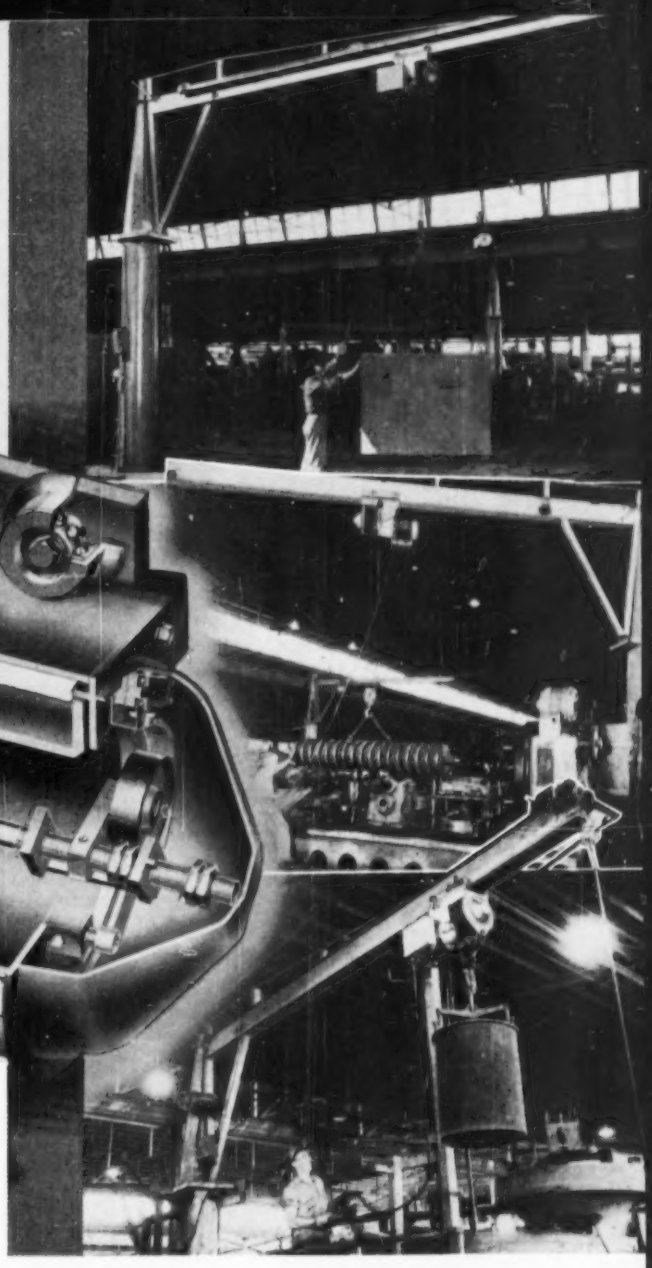
Many completed assignments probably can be reported in regular periodic reports. But special projects may require the submission of a special report. And the final report of a long-term project should

To Keep Your Boss Happy

1. Get the facts. Be sure you can answer the questions your boss asks about the problem.
2. Distinguish between facts and conclusions. Facts can be seen, observed, or measured. Conclusions are interpretations of facts.
3. Submit recommendations. When you present a problem to your boss, have a recommendation ready.
4. Have an alternative plan ready in case your first recommendation runs into trouble.

BIG LIFTS
Demand the
BIG BRAKES
of LeTourneau Hoists





Combination Motor-Load Brake Gives Positive "Inching" Control

The first lift tells you — here's a hoist that delivers when you signal. Pick up your load. The ready-to-go LeTourneau Motor lifts the load *instantly* — delivering maximum torque to lift your load during even the briefest period of electrical contact between switch and motor. Then, no matter how short the lift, when the load is where you want it, release the control button: The load *stops instantly*, without slip — whether going up or coming down. The reason for this positive control is the LeTourneau *combination motor-load brake*. It's synchronized with the motor to let you "inch" any load of 4 to 15 tons to the exact level you want it. The high braking capacity friction surfaces engage automatically when power is cut off in the motor circuit — and release just as quickly when motor is started. As a result, you can now get the absolute load control you've always needed.

This control is possible because of "matched" design and construction, for LeTourneau manufactures *all* the hoist components: the variable-speed A. C. motor, the integral automatic brake system, and the simple gear reduction and all-steel housing.

A new bulletin has been prepared to give you the full story on these hoists and how they will make your *big* lifts easier. Write for a copy today.

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LeTourneau Hoists Handling BIG Lifts: Top illustration: maneuvering a heavy crate on a loading dock. Center illustration: positioning a steel mill roller in a machining lathe. Bottom illustration: transferring materials during heat treating.

Write for full information on LeTourneau Hoists and Jib Cranes.
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Title_____
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XF 102

clearly indicate that the job is completed.

3. Deviation from approved plans. This type of report may not be so pleasant. Let's assume that a definite work schedule has been set up or that you have mapped certain plans involving production, maintenance, or some other phase of your activity. Then suddenly you become aware that it will be necessary to deviate from schedule or approved plans. It might be from material delay, equipment breakdown, any number of reasons—even a mistake on your part.

Here you should know how much responsibility has been delegated to you. Chances are that you should take action but make an immediate report. Any deviation may affect other departments or divisions, so your superior should be in a position to authorize any other changes necessary to compensate for the deviation.

Good management does not relegate lack of progress to a mere detail on a progress report. The quicker it is detected and reported, the sooner action can be started. That's true for mistakes too—overlooking or trying to conceal them can be a lot more serious than making them.

4. Anticipated problems. The reports suggested so far may cover the work normally assigned to you. But it does not cover the implied delegation of responsibility to make helpful recommendations.

The successful businessman must think in the future. The major interest in a company is not how much money was made last year, but how can the company make more money this year—and next year and the years after that. So the really valuable executive is one who anticipates the problems ahead and can suggest solutions for them or ways to avoid or at least minimize them.

Knowing what to report to your boss must be supplemented by knowing how to report. The two ways: oral or written. The written report takes more work but it provides a permanent record for the files. Also, it permits your superior to refer it easily to higher authority if necessary, and you can be sure that credit will be given where it is due—to you. Major problems will probably require a combined oral and written report.

Whatever the form may be, the report should be clear. Check it to make sure it answers these key questions: What is the subject matter or the problem? Why is the report being made? How can it be solved—or performed? Who is to do it? When and where is it to be done? And keep the *what* and *why* first in all your reports.—Oil & Gas J, Aug 30, p84

Fuse Cuts Concrete Pipe

A method of cutting reinforced concrete pipe with explosives is being tested by United Concrete Pipe Corp., Baldwin Park, Calif. Preliminary results indicate that it may be faster and cheaper than the conventional method of using air hammers or hammers and chisels.

Atlas Powder Co.'s Primacord fuse is wrapped around the pipe and detonated with blasting caps. The number of turns and position of the cord produce the desired amount of fracture to sever the pipe. A distinct, clean crack is obtained completely around the inside of the pipe to permit chipping of the concrete and cutting of the reinforcement. —Const Meth & Equip, Sept, p140

Good Package Design Catches Shopper's Eye

Scientific package design helps boost sales of E. L. Bruce Co.'s household floor waxes and cleaners. Tests were made to determine what is desirable and what undesirable from the sales standpoint.

Tests included a record of eye travel over the label; the amount of time it takes a customer to identify brand name and recognize design form, ease or difficulty in reading the sales message; and other important factors. The container that evolved from these tests is superior for the following reasons:

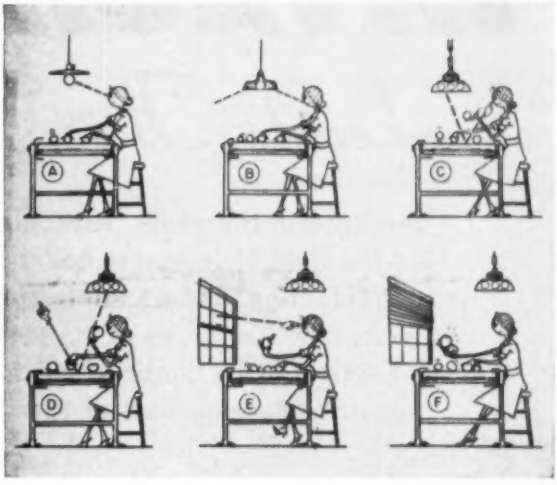
- It is a metal container; 88% of housewives prefer metal containers for wax and floor-care products.
- New Bruce logotype gives instant brand identification.
- Product usage is pinpointed on the front. The housewife has no trouble picking out the product she wants.
- Modern design of the front panel makes Bruce hard to hide on a shelf and makes the container look larger in size than it really is.—Mod Packaging, July, p98

Straddle Truck Handles Seven Pallet Loads

The U.S. Naval Supply Depot at Oakland, Calif., developed this long wooden skid to transport palletized loads over rough ground where fork trucks could not operate. Fork trucks load and unload the skid. The straddle truck lifts the load by means of projecting pieces bolted to the sides of the skid. Truck can handle seven pallets in one load.—Factory, Sept, p96

New Ideas Tell How To...

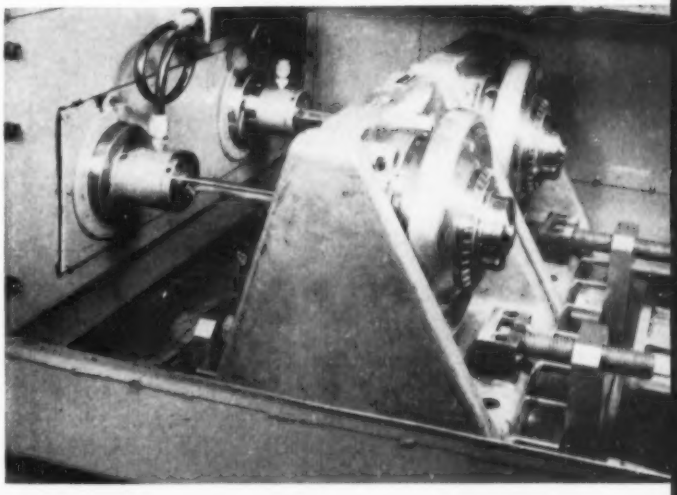
. . . end workers' eye strain



Glare caused by bad plant lighting increases eye fatigue among workers, lowering their morale and efficiency. Here are some ways of spotting and beating it:

(A) Direct light from bare light bulb puts too much light in worker's eyes. (B) Shading directs light where it belongs. (C) Reflected glare often is even worse. (D) Relocating fixture eliminates glare. But you will need a baffle down the middle to protect worker on the opposite side of the belt. (E) Daylight shining directly into eyes is bad—so are bright sunlight patches anywhere in the field of vision. (F) Shading windows or diffusing light to a low brightness guards worker.—Food Eng, Sept, p56

. . . gun-drill to high accuracies



Gun drilling on Bryant model 998 boring machine equipped with preloaded ball-slide parallel bar ways gives these advantages: improved production, better surfaces without subsequent reaming or lapping, and straighter holes.

The example shows a 0.275-in. hole being drilled to 2 21/32-in. depth in a pump piston rod. Finish is 63 mu in. rms. or better. Production rate is 106 parts per hr. on a two-spindle setup at a speed of 450 ft. per min. and feed of 3.1 in. per min.

Requirements for successful gun drilling include a rigid machine to avoid vibration, drills longer than hole to avoid chip jamming, high coolant pressure to wash out chips, good alignment between work and drill, and close drill tolerances.—Am Mach, Aug 16, p162

. . . store oil in quarry

An abandoned slate quarry in Pennsylvania now provides a fuel-oil reservoir for Standard Oil Co. of N. J. Its capacity is 42-million barrels—largest single oil-storage facility in the world.

Oil is pumped 65 miles from the company's refinery into the quarry. As oil enters the quarry, water is pumped out. When oil is pumped out, water is pumped back into quarry, thus maintaining the surface of the pool at the same level at all times.

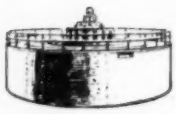
The quarry is 250 ft. deep and irregular in contour. The entire surface of the pool is covered with a raft made up of hollow steel pontoons that float on the oil surface.

Oil is always at least 20 ft. below the top level of surrounding ground water so that pressure outside the quarry is greater than the inside pressure. This prevents loss of oil.—Eng News-Rec, Sept 16, p24

HITACHI

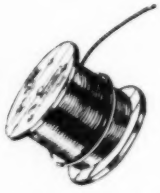
Leads The Field

Throughout the years, Hitachi, Ltd. has led the field of Japanese heavy industries in production, industrial technique and reputation. Today, as in the past, Hitachi is continuing its contribution toward the industrial development of the world.



Electric Power Station & Sub-Station

Rolling-Stock



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Malleable Iron Castings

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Cermets Flame-Sprayed Onto Jet-Engine Parts

Continued research has given Ryan Aeronautical Co. increased knowledge and a wealth of experience about high-temperature coatings. The company has applied these 0.001-in.-thick refractory coatings to many parts for aircraft engines.

One technique developed, but still in the research stage, consists of flame-spraying powdered refractory materials with a modified metal-spray gun. Ryan has sucessfully flame-sprayed nickel-magnesia cermet on stainless steel, Inconel, and other high-temperature alloys.

This cermet has a high fusing temperature and cannot be applied by ordinary furnace fusing methods. Insulated furnaces that can provide the required temperatures are expensive. Another drawback is that jet-engine alloys lose strength at high fusing temperatures. Flame-spraying avoids these limitations.

Nickel-magnesia powder is forced by nitrogen into the hot torch nozzle. An oxygen-acetylene flame at 5500° F. liquefies the cermet and sprays it on the metallic surface like a fiery paint. The cermet adheres in a coating that can be applied to the desired thickness.—Ceramic Ind, Aug, p65

Platform Mounts Radar at Sea for U.S. Defense

Guarding the U. S. against surprise air attack is a vast radar network circling the entire country. Latest development in setting up the network will be a series of offshore platforms mounting radar gear and personnel accommodations. Each platform will be completely self-sustaining.

The platforms will be permanently anchored on shoals as far as 125 miles off the Atlantic coast. Construction of the platforms will be completed on shore. Then the entire structure will be towed, barge fashion, to its location at sea.

DeLong Eng'rg. & Const. Co.'s air jacks will raise the platforms above the sea. Caissons will be dropped through holes in the platform to bed on the ocean floor.

Air jacks at each caisson will then lift the platform out of the water. Next, the caissons would be driven to adequate penetration and bearing values by pile drivers. Finally, each caisson would be welded to the platform, cut off flush with the deck and covered by permanent flooring.—Eng News-Rec, Aug 12, p23

Belt Raises Coal Output

A new extensible-belt conveyor made by Joy Mfg. Co. is expected to let a continuous coal-mining machine operate 75% of a mine's working hours.

At each end of the belt is a self-propelled unit mounted on crawlers. Between the two units are a series of stands that store 50 ft. of belt for advance or retreat. Conveyor stands can be added or removed without bolts or tools while the unit is running. Average time of insertion or removing 100 ft. of belt is 5.3 min.

In one test setup, output per unit was increased to 325 tons per shift from 200 tons.—Coal Age, Aug, p126

Save Time, Save Money; Here are Seven Ways

Time is what you buy from most office employees. Your problem is to provide the means to convert the time into effective production. You can save time these ways:

1. **Develop and use manuals** for routine work. They can help guide work performance, answer questions, and train new employees.
2. **Study the workload** for each position. Unfair work distribution can ruin office morale.
3. **Decentralize authority** to permit action at the line of operation. Channeling problems to top management wastes everybody's time.
4. **Schedule all work** and establish priorities. Management should retain control over the schedule.
5. **Give proper training** for work efficiency.
6. **Simplify the work,** eliminate unnecessary details.
7. **Spot check** the work for quality control. Inspection of 100% of the work is costly.—Am Business, Aug, p14

International Business Briefs

Vienna—The three largest transformers ever exported from Austria, each weighing 105 tons, have been shipped to the Bonneville Power Administration at Seattle, Washington, by the Elin plant of Weitz, Styria. This makes nine large Elin transformers shipped to the U. S. since 1945; twenty more are on order.

New York—Using airframes and wings supplied by Piaggio & Co., Italy, the Kearney and Trecker Corp., Milwaukee, Wisconsin, will assemble a twin-engine 5-passenger amphibious plane for sale to U. S. businessmen . . . Fairchild Engine & Airplane Corp. will produce a twin-engine transport similar to the DC-3 in collaboration with Fokker of the Netherlands . . . Fletcher Aviation Corp., California, will ship 100 FU-24's (a newly developed agricultural plane) to New Zealand interests; the slow-speed, high-load single-engine plane will be used for spreading fertilizer.

Athens—The Greek Public Electricity Co. has signed a preliminary contract with the French Omnium Lyonnais and Cotesi companies for construction of the Megdova 84,000-kw. hydroelectric plant; the same two firms will build the bulk of irrigation works of the over-all Megdova project—estimated to cost between $12- and $13-million.

Bombay—India's Ghias and Germany's Bayer firms will build a dye plant here to be ready in 2 years. Authorized capital is $4.2-million, with initial outlay set at $315,000, one-third to come from Bayer. The Tata interests are also concerned in the venture and may supply later finance.

Geon Boxes Stamped

Geon, a rigid vinyl plastic made by B. F. Goodrich Chemical Co., can be fabricated on a conventional metal stamping press, instead of by customary plastic injection molding. Geon boxes shown are made from 1/20-in.-thick sheeting embossed on one side. It is fed under strip heaters to raise its temperature to 275° F. before stamping. Cycle time is 10 sec. —Prod Eng, Aug, p196

Gas Turbine Top-Rated after 30,000-Hr. Run

Unit No. 3, the first commercial central-station gas-turbine installed in the U. S. (McG-H Digest, Mar '52, p46), received its first major overhaul at Oklahoma Gas and Electric Co. after running nearly 30,000 hr.—longer than any other gas turbine in the world.

Excellent operating and economy results have been obtained from this General Electric Co. turbine, which went into service in July 1949. A simple-cycle unit, it burns natural gas and exhausts into heat-recovery equipment.

The fuel burned generates 4,500 to 5,000 kw. and through waste-heat recovery provides an additional 2,500 kw. from the 400-lb.-per-sq.-in., 750° F., 2-in. backpressure steam end of the plant. Heat rate of the fuel fired in the gas turbine is about 13,000 Btu. per kw.-hr., or 26% thermal efficiency.

With waste-heat recovery, these two turbines have raised the plant's capability from its boiler limitation of 51 megawatts to 66 mw., with a corresponding reduction in over-all plant heat rate of 2.5%. Both units were installed at a cost of slightly less than $100 per kw.—Power, Aug, p75

What To Do . . .

When You Reduce Costs

There is no easy approach to drastic cost cutting. One thing is basic to the problem and that's ideas. Here is a discussion of how you can get them

SUPPOSE you are a plant-operating executive. Suppose you are told to cut costs "at least 10%, maybe as much as 20%." Well, what do you do? Unfortunately, it is no one thing.

It is many things: plans that fit the needs; extra effort by many people. Basically, what you will need are ideas—ideas that (1) improve performance with present methods and facilities, (2) change methods, including minor changes in facilities, and (3) change processes or facilities, requiring high-level approval.

1. Ideas that improve performance. Projects in this class involve such excess costs as:

- Variances from budgeted costs for specific accounts or products that have been showing regularly or frequently on your cost breakdowns.
- Material losses that have been accepted traditionally.
- Overtime and other excess labor costs that no one has taken the initiative to eliminate.
- Poor utilization of machines and equipment.

2. Ideas that improve methods. Work simplification is the objective here. Usually the improvements require changes in manual work pattern, addition of jigs or fixtures, minor changes in product or processing facilities. They require the industrial-engineering type of analysis and development, and little expenditure of money.

3. Ideas that change processes. These are the "giant-step" changes in product, layout, processes, and equipment that require technical knowledge to create, much engineering to develop, and an approved appropriation to put into effect.

It takes more time to start and complete a project of this kind than is usually available during a cost-reduction campaign. But you can take advantage of the campaign to (1) stimulate interest in a production problem that needs creative technical thinking to solve or (2) expedite engineering work or approval on a project that has been in process.

To get results you need plenty of ideas, and more projects must reach the installation stage in less than normal time. There are five ways to do this:

1. **Have a backlog** of ideas on which to work. The best way to do this is to record them in writing, then file them.

2. **Get more people** contributing ideas. A suggestion system is one way of getting ideas from employees. Campaign time is the time to give the system some stimulation.

Staff departments can contribute ideas too. And you can always get help from outside the plant. Consultants can come in anytime to recommend ways to cut costs.

3. **Get more ideas** per man-hour. If it's your job to cut costs, then you must decide how to handle your people to help them produce more good ideas.

4. **Put ideas to work** with more people. Before an idea can cut costs, it must be applied. The job of taking a suggestion, studying it, and carrying it through to rejection, modification, or installation is not technically complex. Every plant has people qualified to serve—in quality control, time study, plant engineering, product design, accounting, purchasing. And make use of your foremen.

5. **Speed the handling of ideas.** During a cost-reduction drive it seems only reasonable that all specialists who must review ideas and offer advice, and all who must approve or disapprove, should automatically give priority to cost-reduction ideas.

Another way to speed handling of ideas is to hold daily meetings of those most needed for consultation and approval. The group's one job is to act quickly and decisively.—Factory, Sept, p118

Chrome-Plate Salvage Saves Complex Castings

Hard-chromium plating recently helped Towmotor Corp. salvage some complex castings that otherwise would have had to be scrapped. The parts were axle housings in which bearing holes had been bored oversize.

Axle housings were too large to fit into the company's plating unit, so each housing, set up alongside the plating unit, was made to serve as its own tank. The bottom of the oversize hole was plugged, and the hole filled with the plating solution. The electrode was then inserted in the solution, and the plating begun. Solution temperature had to be watched closely to avoid overheating because of the small amount that could be used.

Another salvage job successfully carried out was the plating of an oversize hole in a transmission case. As the hole was too shallow to hold enough solution, a glass jar was clamped to the underside of the hole against a rubber washer. Plating solution was then added to fill the jar and the hole.—Am Mach, Aug 16, p142

Aluminum-Alloy System

Last month the new alloy designation system for wrought aluminum went into effect in the U. S. It is expected to meet all present and future needs for wrought-aluminum alloys.

The new system is based on four numbers. The first digit indicates the general group, and the second any modification of the alloy or impurity limits. The last two digits identify the alloy or indicate the aluminum purity, that is, the minimum aluminum percentage.

The 1xxx series designates minimum aluminum purities of 99%. The 2xxx through 8xxx series designate elements: copper—2, manganese—3, silicon—4, magnesium—5, magnesium and silicon—6, zinc—7, others—8.

To help the transition, many of the old numbers are retained as the last two digits. Thus, alloy 3S becomes 3003, alloy 24S becomes 2024, and 61S becomes 6061.—Prod Eng, Sept, p207

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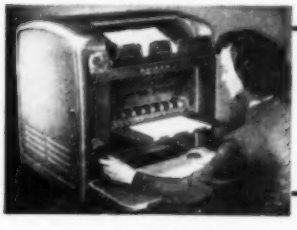

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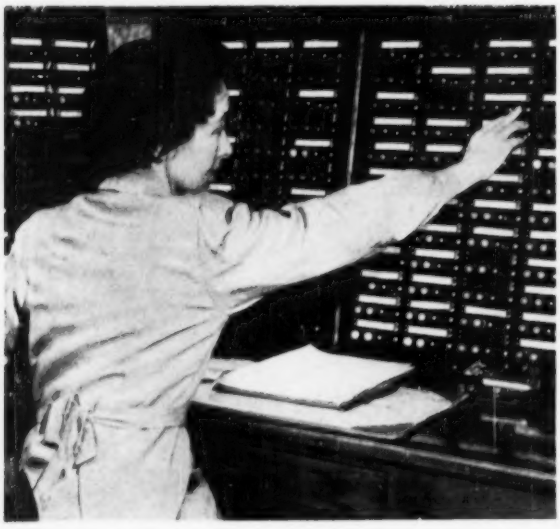
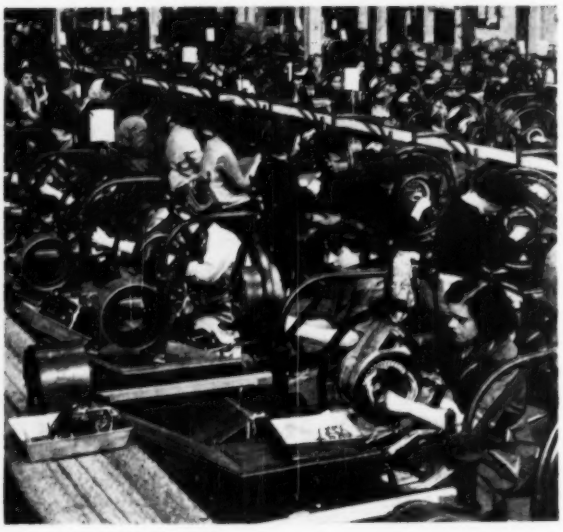
Central Control Routes Work to . . . *. . . Stator Winders by Means of . . .*





Centralized Conveyor Control

New conveyor helps electric-motor manufacturer gain better production flow, thereby increasing production, cutting overhead, reducing lost time

EFFICIENT PRODUCTION flow is an urgent requirement for economical manufacture—whether the product be macaroni or motors, applesauce or automobiles. But the problem of getting such flow varies, not only from product to product, but also with the conditions that may be peculiar to your plant alone.

Brook Motors Ltd. recognized all this when it tackled the layout of the winding department at its new factory in Barugh Green, Barnsley, England. It recognized that its layout would have to achieve efficient flow despite these factors:

• **Variation** in product. The new factory was to handle the winding of stators for motors from fractional size to 5 hp.—a total of 30 different types of stators, with 500 variations of winding and voltage combined with ten alternative speeds.

• **Variation** in work complexity and worker skill. Some stators could be wound only by well experienced winders; work therefore had to be selectively fed to winders according to their skill.

• **Variation** in operation time. Size and complexity of stator determine the winding time, with an average of about ½ hr.

• **Physical considerations** involved in handling of heavy stators by women workers.

The new conveyorized layout incorporates a unique semiautomatic and fully automatic control system utilizing electronic devices and telephone type equipment. It has cut production overhead by 20%.

Each of the three lines now operating (five are planned) consists of 40 winding stations arranged in pairs on opposite sides of a belt conveyor. At each station, an incline leads from the belt to a table on which the next job rests while the operator is winding the stator held in the winding fixture.

When the operator finishes one job and transfers the reserve job to the winding fixture, a spring-loaded flap in the center of the table lifts and, by microswitch, lights a red signal lamp on a central control board. Over each red signal lamp, one for each winding station, is posted a tab bearing the station number and the winder's name and skill grade.

The controller, having this information, selects a work order from a classified file to suit the skill of the worker and writes the station number on it. The work order, which serves as a stores requisition, job card, and despatch order, passes to the stores area.

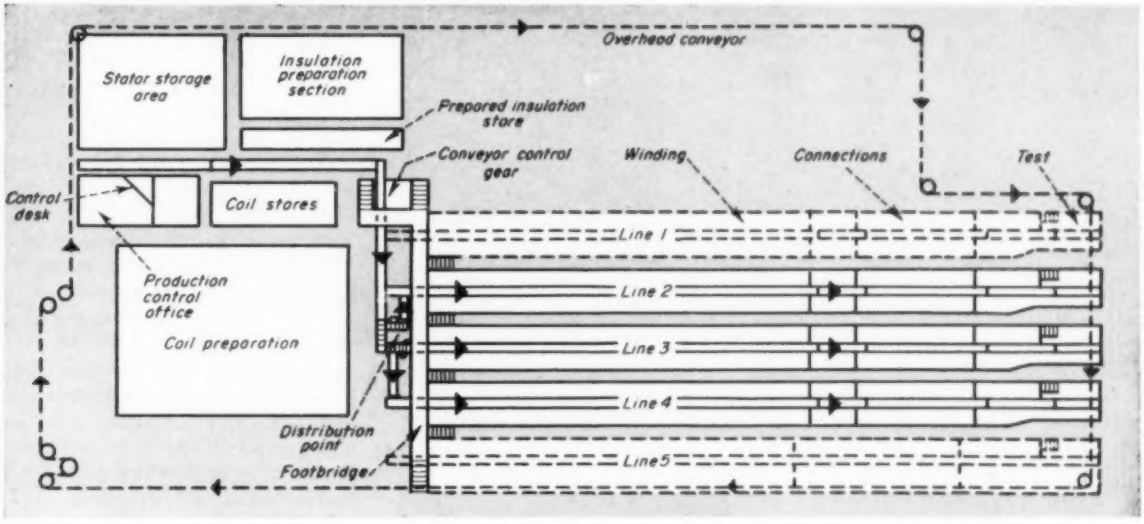
Components here are assembled on a belt conveyor and carried to a cross conveyor. The latter conveyor takes the parts to a distribution point, at which the job is routed to the correct winding line.

Selector panels at the distribution station control the winding-line conveyors, which normally are stationary. Each panel, one for each line, has rotary selector switches that enable the distributor to determine the station at which the work will automatically stop.

The control mechanism has a slotted disk coupled by a magnetic clutch to the driving drum of the conveyor. In effect, it measures the distance the belt travels.

When the disk is de-energized, it swings freely but is weighted so that it always comes to rest against a fixed stop with the first radial slot vertical. A beam of light is pro-

. . . This Unique Conveyor System, Which Will Have Five Winding Lines



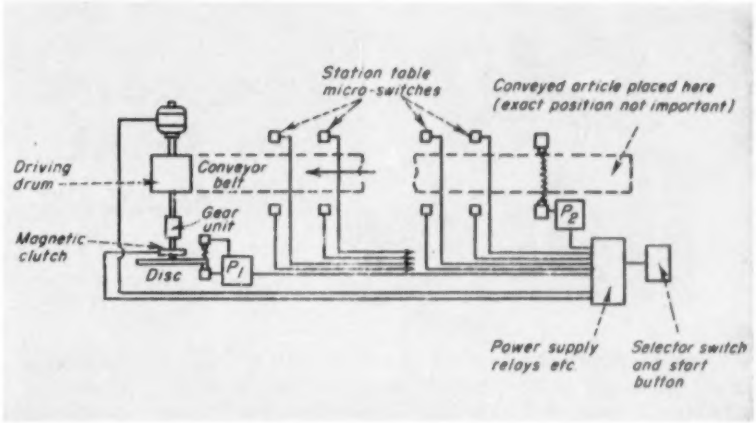
jected through the slots onto a photoelectric cell.

When the work on the conveyor interrupts a light beam projected onto a second photocell, the magnetic clutch is energized and the disk starts rotating. Pulses produced by the disk as its slots pass the light beam operate a uniselector, or stepper, switch—a standard piece of telephone equipment. The arm of the stepper switch moves along the contacts until it reaches the contact selected by the selector switch. At this point, a relay opens and the conveyor stops.

The work is now opposite the selected station. The winder slides the stator frame and other components off the belt and down the incline to the table. The spring-loaded flap is depressed and, again by microswitch, clears all circuits. The counting disk and stepper switch are restored to zero, and the light at the central control desk goes out, thereby informing the controller that the work has been received.

After a stator is wound, the operator slides it down a ramp to a lower conveyor belt. This intermediate conveyor carries wound stators to the feed conveyor for the connection section, where windings are connected and terminal boards fixed.

The end of the intermediate conveyor and the beginning of the feed conveyor are close enough together so stators can pass from one to the other. When a stator on the intermediate conveyor interrupts a photocell light beam, the conveyor stops until work is required at one of the connection stations.



TWO PHOTOCELLS, P_1 and P_2, control length of belt travel by a slotted disk that, in effect, counts stations until work arrives at the prese'ected station

Control of the connection-section feed conveyor is basically the same as that of the winding-section conveyor system. A slotted disk determines belt travel, and each station has a spring-loaded flap in the reserve-job table. An additional stepper switch makes the operation fully automatic.

This switch is kept in continuous motion by an electronic pulse generator. Thus it is continuously "searching" for a closed table circuit, indicating that another job is needed at one of the stations. When a closed circuit is found, the switch stops, the intermediate conveyor belt moves another stator to the feed conveyor.

The stator, on the feed conveyor, interrupts a photocell light beam, causing energizing of the magnetic clutch in the disk drive and disk rotation. From then on, the action is the same as on the winding conveyor.

After connections are made, finished stators are conveyed on a pushbutton-controlled conveyor to an elevated test station. Finally, an overhead conveyor carries them to a bake oven.—Mach, Sept 4, p1541

One of the compact, odor-free, Duo-equipped waste treatment plants on the Pennsylvania Turnpike.

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Here's a good example. A high degree of treatment is required at the various restaurant and service areas on the Pennsylvania Turnpike. One Dorr Duo Clarigester and one Dorr Duo Filter are installed at each of four stations to provide the identical degree of treatment that would normally have required five separate units. Installation and operating costs are lowered, space requirements are reduced, and operational headaches are practically eliminated.

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Twelve Ways to Lengthen Heat-Exchanger Life

Most heat-exchanger problems are caused by erosion-corrosion attack of tube ends and tube sheets. Studies by Standard Oil Co. (N. J.) have shown how to reduce these problems:

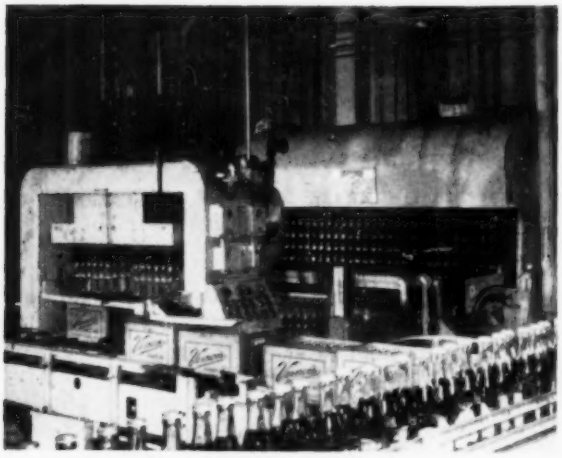
1. **Designing** for proper velocity and a streamlined flow of clean water. Perhaps the most precise step, it includes use of water-outlet control valves and adequate crossover area in floating heads.
2. **Screening** and treatment of the water supply.
3. **Use** of compatible materials.
4. **Proper handling** during construction to avoid damage to exchanger parts. At damaged areas, even mildly corrosive conditions in service can cause failure.
5. **Proper control** of cooling-water temperature and velocity. Temperatures range from 65° to 93° F. Minimum velocity is 3 ft. per sec. for salt water, 2½ ft. per sec. for fresh water.
6. **Thorough cleaning** and drying of condensers during shutdown.
7. **Maintenance** during a turnaround.
8. **Water treatment** with organic chromium inhibitors.
9. **Use** of tube-end inserts.
10. **Galvanic anodes.**
11. **Neoprene linings.**
12. **Protection** of stored materials.—Oil & Gas J, July 26, p226

Strapping Secures Forms

Using steel strapping to bind 24-ft. concrete-column forms resulted in labor savings of 33% and material savings of 48% on a project erected by Rieth-Riley Construction Corp.

All columns were rectangular, and the forms were pre-fabricated on the ground. After completion, they were lifted over the reinforcing rods. The steel-strapping method saved three-quarters the time necessary to do the job with conventional clamps.

Close spacing of the straps eliminated bulge or spread problems and wave effects on the finished columns. Further economies were effected by salvaging the strapping as falsework was removed.—Const Meth & Equip, Sept, p126



FULL-DEPTH UNCASER automatically lifts empty bottles from cases, feeds them to large washer (rear)

CLEANED BOTTLES flow to automatic 50-spout fillers such as this. Four lines have 1,000-per-min. capacity

Automated Beverage Plant

ADVANCED ENGINEERING, including extensive automation, features new $5-million, 7½-acre soft-drink plant of James Vernor Co., Detroit.

Under one roof are combined facilities for carrying out the company's entire ginger-ale operation, including compounding and aging of the extract, production of syrup, and filling into 8-oz. and quart bottles at more than 1,000 per min. Building contains storage space for supplies and output plus accommodations for over 200 delivery and transport vehicles. Lower floor walls are fully glazed to show all operations to the public.

Operating features include:

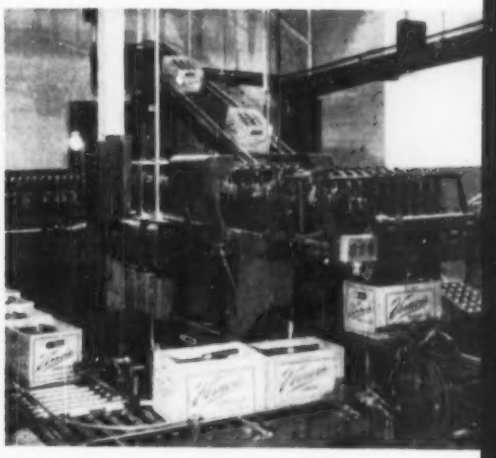
1. Automatic syrup-making. Virtually the entire syrup-making process is done automatically with the aid of signals and control devices mounted on a large control panel. System prevents spillage, insures maximum uniformity, minimizes supervision.

2. Automatic bottle-handling, including uncasing, cleaning, filling, crowning, and recasing. Maximum use of conveyors and automatic uncasers has cut manual handling of a case of empties from six times to one.

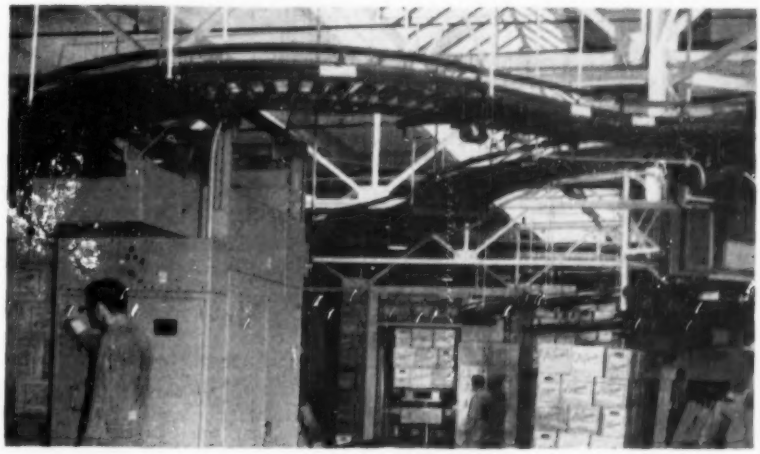
3. Automatic palletization. Together with fork-lift trucks, this completely eliminates manual truck loading and unloading.

The building, in all respects, is completely functional.—Food Eng, Aug, p61 & 118; Sept, p48

CLEANER inverts emptied cases to remove foreign materials before re-use



AUTOMATIC CASER here assembles and packs filled and inspected bottles



PALLETIZERS receive filled cases from overhead conveyors and automatically stack them. Fork trucks then pick them up

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Here are Six Economical Ways to . . .

Boost Power Systems

If your plant switchgear is modern now, you can meet future load growths by making fuller use of existing gear, minimizing new equipment costs

To HANDLE future load growths safely, many industrial plants will have to expand their present electrical distribution systems. Where existing switchgear is modern and adequate within its rating, the problem can often be solved by integrating present gear into a new and larger system that will meet the new load requirements.

But available short-circuit current increases when more motor load, plus larger electrical capacity from the utility or the plant generators, is added to a distributed system. When it climbs beyond circuit breaker and fuse ratings, you are inviting major trouble; if a breaker attempts to interrupt a fault current beyond its rating, an explosion may result.

So proper care must be taken to avoid excessive duty strains. Here are six methods that can help you do the job safely:

1. Split Bus—By far the simplest way of reducing short-circuit duty on an existing bus is to divide the bus into two or more parts. Such division should be made so reactance will be added between each section and the source, limiting the fault-current duty on each bus section to the desired level.

Such reactance between parts of the original bus may be added in the form of reactor, transformer, or cable impedance.

2. Reactor Tie—Where a system is to be expanded at the existing voltage, the reactor-tie method is a relatively simple one. Here the existing switchgear ties into the new switchgear through a reactor, sized to limit duty on existing gear to its rating or below.

3. Transformer Tie—Here existing switchgear joins to a new lineup of switchgear at a higher voltage and interrupting level through a transformer. In a plant wanting to add 1,500 hp. in motors, for instance, it was apparent that a new generator of possibly 1,875-kva. capacity would be needed to help power the new load.

To add this load to existing switchgear, having an interrupting rating of 75,000 amp., would increase the duty to 85,000 amp., or about 15% above the safe limit. Solution here was to select switchgear at a higher voltage, 4,160 volts, and connect existing 480-volt gear to the new bus with a 1,500-kva. transformer.

4. Unit Substations—The most popular method of expanding power systems is with unit substations, bringing high voltage close to new loads. This technique is used most often when the new load is remote from existing loads. Such is the case when additions are made to existing buildings or plant area. It is most widely applied to systems having utilization voltages in the 600-volt class.

In using unit substations, existing switchgear remains as is. Thus there is no danger of increasing its duty. Big advantage is in savings in cable, reduced power loss, and voltage regulation.

5. Synchronizing Bus—Where utilization and generation voltage are the same, and it is not feasible to go to a higher voltage, consider a synchronizing bus. Existing bus is sectionalized; then all bus sections are connected through reactors to a common bus. Hence, interrupting duty is greatly reduced on existing breakers. Furthermore, this installation allows adding new loads and additional incoming capacity. Power is automatically transferred between bus sections if normal source of power to one section fails.

6. Duplex Reactors—Where systems have large power sources compared to their utilization voltage (example: adding a 10,000-kva. generator to a 2,400-volt bus),

a duplex reactor scheme may be the answer. Here the new generator, plus the motors on the bus, gives a momentary duty of 70,000 amp. when only 60,000-amp. breakers are available.

It may also be used where utility or plant-generated power is brought into the system at current values above available breaker's continuous current ratings.

These six methods are flexible tools for the designer of industrial-power distribution systems. In many plants, two or more of these methods may be applied to arrive at the best way to expand the system, yet make use of present switchgear.

Keep in mind that a plant expansion need not all be made at the same time. Frequently expansion can be handled on a step-by-step basis as money is available.—Power, Sept, p81

Reinforced Plastic Tanks Made with Epoxy Resins

Two Oklahoma City firms, National Tank Co. and Murdock Tank & Mfg. Co., are building reinforced plastic storage tanks by using epoxies instead of polyesters as the base resin. The idea is to improve corrosion resistance.

Tank cost is high—from two to two-and-a-half times as much as a steel tank. But advantages of the plastic are claimed to more than offset the increased cost. Tanks will last much longer in storing materials such as sour crude oil. Their lightweight makes them cheaper to ship, easier to erect.

In making the tanks, the staves, bottoms, and decks are formed in steam-heated, hydraulically operated molding presses. Three layers of continuous glass fibers are laid in chromium-plated dies, with each layer saturated with resin. Surface fibers lie horizontally across the 4-ft. width of a 4 x 81-ft. stave. The middle layer of fibers run vertically across the 8-ft. length. Sections are compressed to ¾-in. thickness at pressures of 2,000 lb. per sq. in., then cured at 250° F.

Dome, ladder, flanges, and other accessories are similarly molded of the same material.—Chem Wk, July 17, p40

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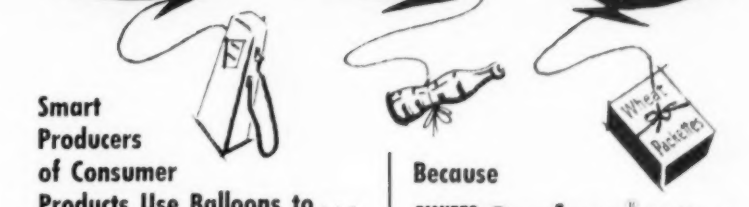

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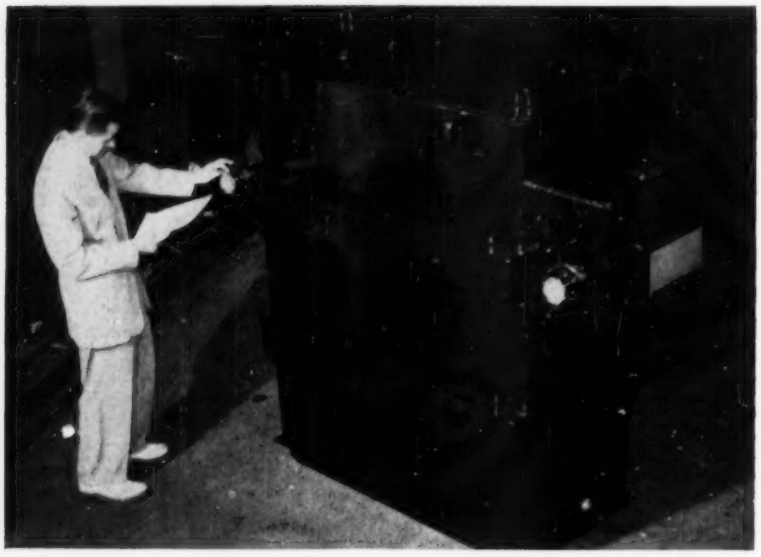


Electric Water Heater Gets Lake-Bottom Job

This power transformer is being installed by the Rochester Gas and Electric Corp. at the bottom of Lake Ontario about a half-mile offshore. Its job: to supply electrically heated intake screens at the mouth of a 3,600-ft.-long, 7-ft.-dia. concrete pipe bringing condensing water to the plant. The underwater heating system is needed to prevent ice formation at the intake, which last winter slowed down the normal water flow of 115-million gal. daily. The 2,300-440-v., 3-phase transformer, normally rated at 300 kva., will carry 1,000 kva. to offset cooling of the transformer by surrounding cold lake water. It will receive power over a 2.3-kv. cable installed in the pipe by pulling successively larger lines.—Elec World, Aug 30, p46

More Uranium—Two important uranium discoveries have been announced by South Australian authorities. First is a vast new uranium area discovered 75 miles northwest of Radium Hill. Second is a new uranium-ore treatment process. Ore will be crushed to 1-in. pieces and dropped into a semi-liquid mixture. Pieces containing a high percentage of uranium ore will sink and be siphoned off.—Eng & Min J, Aug, p168

Mill Developments—A waterproof fabric with a rubber coating that "breathes" has been developed by Alban Rubber Co., Philadelphia, Pa. . . . Burlington Mills Corp. has developed a work-clothes fabric of a 90-10 Orlon-rayon blend that has resistance to battery damage and stains. . . . A dish towel woven of viscose yarn has been developed by Leshner Corp., Hamilton, Ohio. New towel absorbs water twice as fast as cotton.—Textile World, Aug, p198

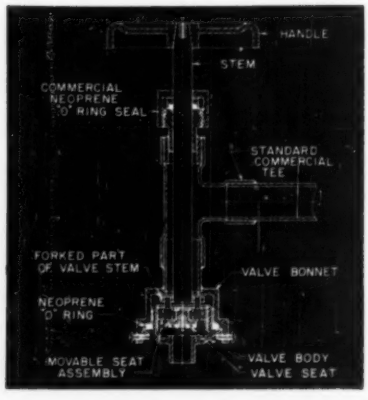
'Copter Noise Reduced—Padding cabin interior of New York Airways Sikorsky S-55 helicopters with 1-in.-thick vinyl-plastic-backed Fiberglas reduced noise level from previous average of 112 decibels, with 118-db. peaks, to a range of 106 to 111 db. Padding sharply reduced high whine from engine drive shaft and gearing—chief source of passenger complaints.—Aviation Wk, July 19, p92

Loads Furnaces—The Auto-Loader, developed by Funditor Ltd. of London, eliminates the hard work in charging metal-melting furnaces. It employs a mobile skip, which is lifted into charging position by hoist.—Mach, Aug 21, p1491

Tin-free Cans—American Can Co. expects future tinless cans to come from a number of metals now under investigation. Metals include untinned steel, specially treated steel, aluminum, zinc, and possibly nickel. Enamelled steel is leading candidate.—Mod Packaging, Aug, p185

Sea Water—Pacific Gas & Electric Co.'s new Morro Bay, Calif., power plant will operate on sea water. Three evaporators will remove salt and supply 72,000 gal. of fresh water per day. Cost will be between $1.50 to $4 per thousand gallons.—Chem Wk, Aug 28, p52

Russian Forging—Presses of 500- to 4,000-ton capacity are replacing forging hammers and high-frequency heating (2,500 to 4,000 cycles per sec.) is replacing oil and gas heating in Russian forge shops. Advantages of presses are greater output, material savings, better working conditions, possible automatic control, less machining needed.—Am Mach, Aug 30, p130



High-Vacuum Valve

U.S. National Bureau of Standards has just developed a seal-off valve for high vacuums. Its handle, stem, and bonnet can be removed and used with any number of seal-off seats, leaving only the closed valve seat on evacuated equipment. Advantages: (1) complete valves neither needed nor left protruding from small pieces of equipment, (2) no exposure to atmosphere as with tubing seals, (3) permanent pumping tap provided that can be used many times without soldering or welding.—Pet Proc, Sept, p1437

Steam Boost for Gas Turbines—By adding steam to the air in the gas-turbine cycle, both unit installation cost and heat rate can be lowered. Steam-generating equipment, now under development, can also raise both capability and thermal efficiency of existing and new units. For example, a gas-turbine plant rated 5,700 hp. at 25% thermal efficiency can be boosted to 7,500 hp. at 29% thermal efficiency.—Power, Aug, p94

Constant-force Spring—Flex'ator, made by Hunter Spring Co., is essentially a compression coil spring. But its two ends are offset so compressive force causes it to bow out, or flex, rather than compress. One suggested use is exertion of constant force on commutator brushes.—Prod Eng, Sept, p129

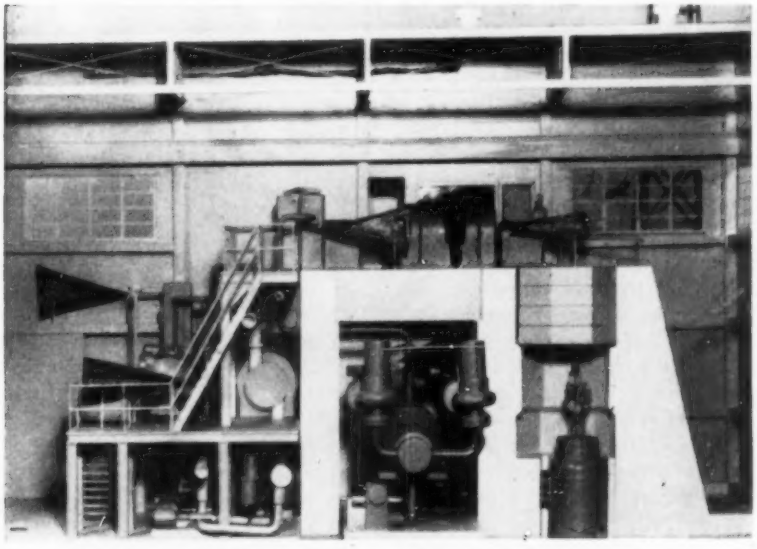
Hardfacing Inside Pipe—C. F. Braun Co., Alhambra, Calif., hardfaced interiors of pipes 10 to 14 in. in dia. and up to 10 ft. long. It did the job by using a newly developed tubular hardfacing rod in coil form in an automatic submerged-arc welding head mounted on an 11-ft. boom. Beads are laid in longitudinally.—Weld Eng, Sept, p42

Sulfur Process—Elemental sulfur will soon be distilled directly from pyrites in a new Noranda Mines, Ltd., plant in Canada. Process will sinter pyrites in two countercurrent stages with first stage deficient in oxygen so part of sulfur is distilled without oxidation. Second stage converts rest of sulfur to sulfur dioxide for conversion to acid.—Chem Eng, Sept, p105

Safer Power Transformers—New transformer installation cuts power-line pole hazards by placing secondary leads next to pole, primary leads away from pole. Universal adoption should eliminate many lineman fatalities, 60% to 70% of which occur on transformer poles.—Elec World, Aug 23, p146

Transistor Mass-Producer

This General Electric Co. device for mass-producing transistors starts with a cylindrical crucible of molten germanium (bottom) to which a slight impurity has been added. A 6-in.-long germanium bar is lowered into crucible and slowly pulled out, with molten metal adhering. The irregularly shaped 4-oz. ingot (above cylinder) is then cut up into 2,000 tiny parts—each the heart of a transistor. Company believes device may help boost U.S. transistor output from 2-million in 1953 to 350-million by 1963.—Business Wk, Aug 14, p133; Electronics, Sept, p8

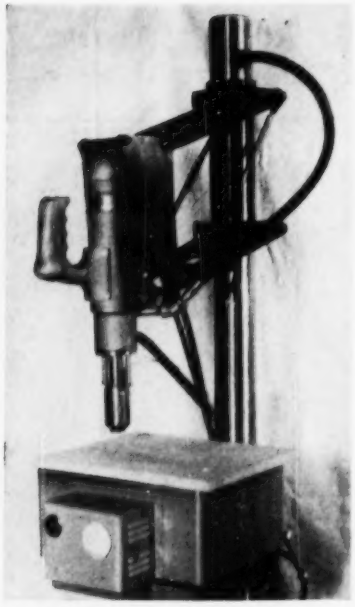


Atomic Power Plant To Be Airborne

Atomic power plant, patterned after the model above, will be built for the U.S. Army at an estimated cost of $8-million. It will serve as a prototype for plants compact enough to be flown in sections by aircraft to remote bases. Capacity of the Army package power reactor will be 1,700 kw. It will fit inside a building 80x29x42 ft. and consist of reactor (lower right), heat exchanger (center), turbocharger (top center), and condenser (left). Power produced will admittedly be high in cost.—Chem Wk, Sept 4, p46

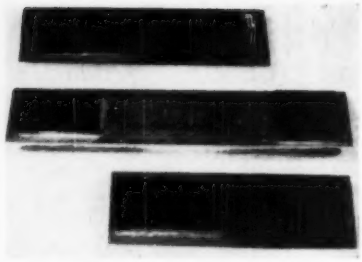
Cuts Mason Labor—A Clark Equipment Co. fork truck cuts number of mason tenders needed in half for contractor J. H. Findorff & Son, Inc. Contractor unloaded bricks onto pallets. Fork truck stockpiled pallets at several locations so that they could be used to supply masons quickly. Pallet-type box also allowed truck to carry mortar.—Const Meth & Equip, Sept, p12

Electronic Egg Handler—An electronic memory system in a California plant knows the quality-grade and weight of each egg and which conveyor cup is carrying it. With this knowledge, it protectively coats certain eggs, but not others. It also drops each egg into right carton. Plant has many other automatic features.—Food Eng, Sept, p44

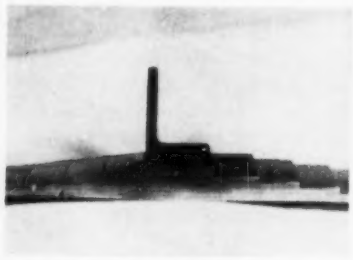


ULTRASONIC soldering equipment includes head and work heating platen

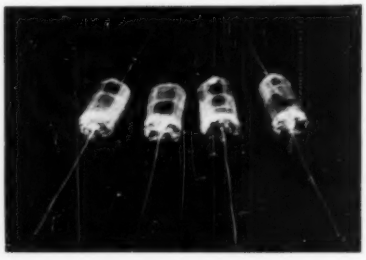
DIE CASTINGS of aluminum are soldered into sealed housing 2½x5½x¾ in.



PLATES of copper or silver can be soldered to aluminum bus bars



LAMINATED ASSEMBLIES are made by bonding sheet and extrusions



ALUMINUM LEAD WIRES can be soldered to aluminum foil condensers

Ultrasonic Fluxless Soldering

High-frequency sound, in the 20,000-cycle-per-second range, makes aluminum soldering quick and easy and helps join copper to aluminum with high-strength joints

ULTRASONIC SOLDERING has been theoretically possible for years, but only recently has it soldered aluminum, copper, silver, and magnesium on the production floor. Advantages claimed for this new process include:

- No flux is used, so excess flux cannot remain to cause corrosion.
- It eliminates the need for a thorough, often costly washing.
- Joints are free of contaminates left by flux residue.
- Surfaces will tin, even with heavy oxide coatings.
- Dissimilar metals are readily joined, as copper to aluminum.

In soldering by this method, heat is needed to melt the solder. In addition to heat, ultrasonic energy is applied as a series of extremely rapid vibrations.

The soldering equipment shown, made by Aeroprojects, Inc., West Chester, Pa., produces ultrasonic energy by means of a powerful magnetostrictive transducer-coupling. This energy breaks down even heavily oxidized surface film on aluminum, permitting it to tin uniformly.

The equipment includes a soldering head and a high-frequency generator. The generator converts 60-cycle current to 20,000 cycles-per-sec. impulses and delivers them to a stack in the soldering head.

The stack, made of laminated nickel sheet, moves 0.001 in. up and down with each change in its magnetic field—20,000 times per sec. This is the vibratory energy that rips up the oxide coating on the workpiece and enables the solder to alloy readily with the base metal. Aeroprojects, by exposing samples to ultrasonic energy for long periods of time, has been able to dissolve considerable amounts of aluminum into the solder alloy.

Parts require no special cleaning before soldering, but they must be heated to a temperature slightly above the melting point of the solder. This is done by the heating platen. Then, after solder is applied to the heated surfaces, the tip of the ultrasonic head is brought into contact with the molten solder. Generally, a soldering job takes from 5 to 10 sec.

The heating platen can heat the work to 800°F. with present equipment. A new unit now being developed will heat work up to between 1200° and 1400°F.

Soldering heads available vary in size and can be changed to meet different requirements. Heads vary from ½ to 6 in. in width. Both flat and curved surfaces can be readily tinned.

Uses of ultrasonic soldering include the joining of die castings. The housing shown above was tested to an internal pressure of 300 lb. per sq. in. after soldering.

Ultrasonic soldering can join dissimilar metals also. A practical example is the soldering of copper or silver plates to aluminum bus bars. This operation, to a considerable extent, solves the connection problem that has been costly in applying aluminum in the electrical field.

Large areas and heavy sheet or plate can be joined together or to extrusions by ultrasonic soldering. Another example of the method's versatility is the soldering of aluminum lead wires to aluminum-foil condensers.—Weld Eng, Sept, p27

Six-Acre Trainshed Roof Raised 1 Ft. by Sleeves

A 6.1-acre, 10,000-ton steel-and-concrete trainshed roof at Chicago & North Western's passenger terminal in Chicago was raised 12 in. to accommodate new dome cars and gallery suburban coaches. Work was planned so carefully that none of the 178 suburban and 58 through trains entering and leaving daily was delayed.

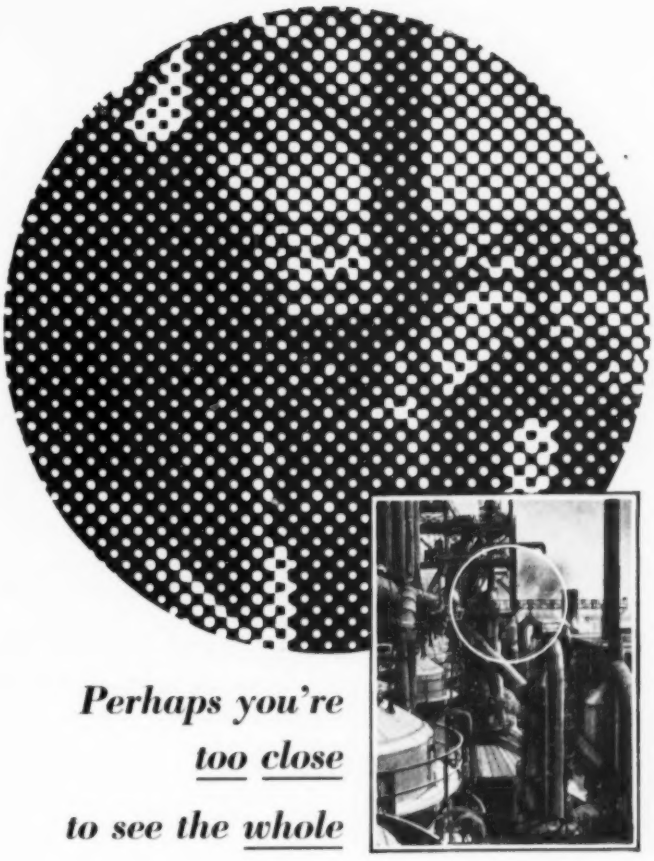
Over 200 double-channel, latticed steel columns supporting the trainshed roof, each carrying an estimated dead load of 35 tons, were raised. This was accomplished by cutting each column and applying a sleeve, welded to the lower portion, in which the upper portion could slide up telescope-fashion by means of hydraulic jacking. Raised upper portion was then secured to the sleeve by arc welding.

Jacking sequence was as follows: The most northerly transverse line of columns was jacked up the full 12 in., adjacent columns keeping pace on the basis of ½-in. "runoff" column by column longitudinally. Thereafter successive transverse lines of columns were brought up the full 12 in. and the run-off was progressively extended.

Including beam and strut connections around edges of roof, there were 300 jacking positions. Lifting operation was completed in 5 weeks. —Railway Tr&Str, Sept, p50

Picks Big Cartons

This grab handles four packaged refrigerators at once in Hotpoint Inc.'s warehouse. Device saves 70% in handling time and 25% in labor. Main support is a plate (arrow) that slips under the upper lip of each carton. A bar—two-thirds of the way down the carton—steadies it as the grab is lifted and moved by overhead crane.—Factory, Aug, p111



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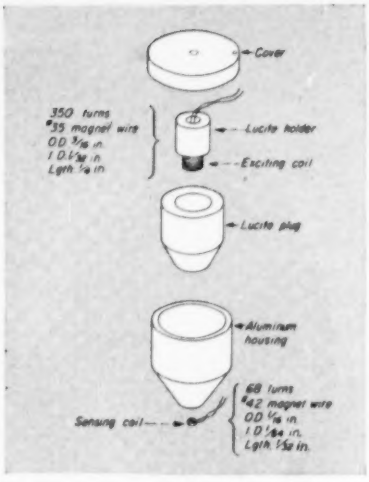
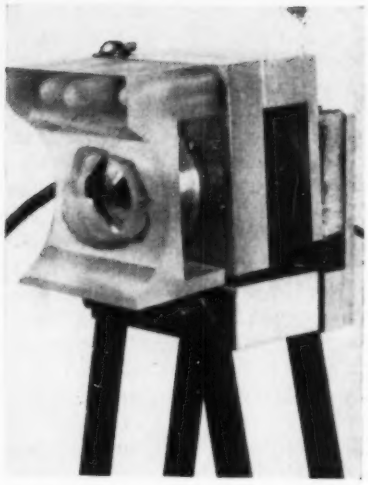
- ▶ Measure the thickness of insulating coatings on conductors.
- ▶ Measure the thickness of sheet metal and foils without contact.
- ▶ Measure thickness changes in metallic coating or plating on metal.
- ▶ Detect cracks, inclusions in bars, tubes, wires, flat surfaces.
- ▶ Sort small parts.
- ▶ Identify shape, depth of flaws, if other variables stay constant.





SPECIAL TEST PROBE is shown in exploded view and photograph. Lucite mask positions it accurately on test bar, protects sensitive exposed pick-up coil.

New Tool for Automatic Tests

Eddy-current sensing devices test metal parts for flaws and imperfections. They are well suited for automatic inspection and control systems

EDDY-CURRENT DEVICES stand almost alone in their selective sensitivity and their ability to amass information. And they can fit into electronic systems that automatically reject substandard pieces. They can determine variations in the conductivity, dimension, and shape, and the distance of the test piece from the test coil.

Conductivity in metals gives an indication of hardness, purity, alloy composition, porosity, and preferred crystal orientation. Porosity changes the apparent conductivity of piece of metal by crowding eddy currents into a relatively smaller volume. Currents cannot pass across microscopic voids and, in being diverted around them, raise the current density in the surrounding metal, thereby lowering the effective conductivity.

Most metallic crystals are noncubic and have different conductivities along their different crystal axes. Eddy currents, therefore, can reveal the presence of preferred crystal orientation in metal objects whose crystals are noncubic. Tests for heat treatment, hardness, and depth of case hardening have also been devised by making eddy-current equipment sensitive to conductivity variations.

Because the conductivity of a test piece and its dimensions (or position) can be measured individually and at the same time, eddy-current devices can be designed for a variety of testing applications. Some of them are listed above, left.

Flaws can be detected in all portions of bars, tubes, or wires, but with greatly increasing sensitivity toward the surface. A probe scanning along at 60 ft. per min. can pick up a discontinuity only a mil wide, a few mils deep, and a small fraction of an inch long.

Although eddy-current testing applies to all metals, special precautions must be taken with ferromagnetic metals (iron, steel, nickel, and cobalt). The permeability of all nonferromagnetic metals is so close to that of free space that any variations in permeability can safely be neglected. However, when ferromagnetic metals are being tested, a strong d-c. magnetic field must be superimposed on the a-c. test field to saturate the sample and reduce its effective permeability to that of free space.

Besides automatic inspection systems, these devices could be adapted to automatic production-control applications. For example, in processes where an insulating coating or plating is applied or sheet metal is produced, eddy-current sensing could monitor the product and control the manufacturing machinery.

Eddy-current testing involves the transmission of energy through a test piece much like the transmission of X-rays, heat, or ultrasonic waves. But the energy actually undergoes a transformation in the process: from magnetic to electric and back to magnetic.

Whenever a piece of metal of any kind is placed in a varying magnetic field, electric currents (known as eddy currents because they follow closed circulatory paths) are set up in the metal. Many of the physical characteristics of the metal such as its size, shape, purity, alloy composition, hardness, or the presence of porosity or flaws help to determine the magnitude, phase, and distribution of these currents.

The currents and their variations can be measured by suitable detecting equipment because they set up a new magnetic field of their own that is detectable outside of

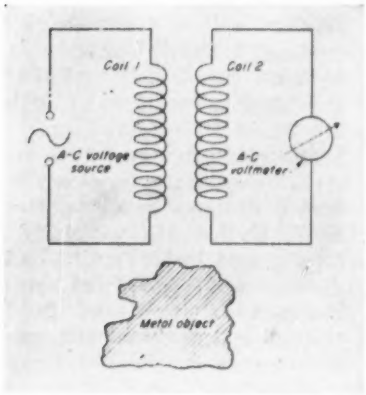
the test piece. This makes it possible to measure several physical characteristics of metal objects by placing the pieces to be tested in an alternating or pulsating magnetic field and making measurements on the resulting field. The depth of penetration of eddy currents can be controlled by choice of the frequency or wave form of the exciting field.

The exciting magnetic field is produced by an alternating or pulsed current flowing in a coil.

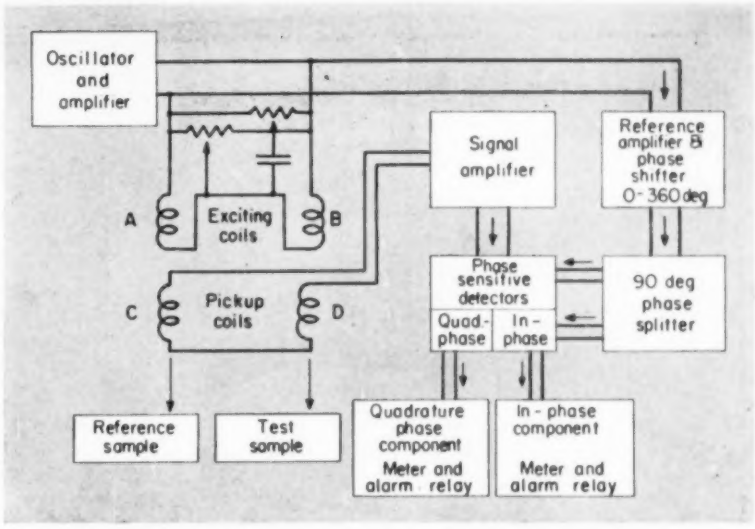
For testing bars, wide coils that encircle the bar are favored for measuring properties that are spread out; for example, over-all conductivity, hardness, porosity, or purity. Narrow coils produce more sensitive responses to small flaws and local diameter variations because they restrict the test region. Tiny probe coils placed on the test piece from the top provide high sensitivity to small flaws when: (1) only the region immediately below the surface is to be tested, (2) wall thickness measurements are wanted, or (3) it is impossible to surround the piece with a coil.

The eddy currents set up by the magnetic field from the exciting coil generate a new magnetic field opposing the original field. What is actually measured is the sum of the exciting and the secondary (or eddy-current) field. For this purpose a pickup coil either surrounds or sits on the test piece. Often the coil is a small probe that can be made to scan rapidly over the surface of the piece searching for field irregularities.

Shape and size of the pickup coil need not necessarily conform to that of the exciting coil. A combination of encircling exciting coil and probe pickup (or vice versa) can be used for some purposes.



BASIC TEST CIRCUIT shows relative position of coils and specimen. Fig. 1.



BLOCK DIAGRAM shows relationship of components of typical phase-sensitive eddy-current instrument. Relay can actuate signalling device. Fig. 2

A simple eddy current test arrangement is shown in Fig. 1. Alternating voltage in coil 1 sets up an alternating magnetic field around the coil. If coil 2 and the test piece are close enough to coil 1 to intersect some of the flux lines of the magnetic field, currents will be induced in them.

If the position of the sample changes but everything else about it remains the same, the voltage reading across coil 2 will drop as the sample is brought closer to the coils. The eddy currents in the sample produce an opposing magnetic field that weakens the original field of coil 1.

Coil 2 responds to the resultant field, which decreases in strength as the sample cuts more and more lines of magnetic flux. The same effect is observed whenever the sample grows in size or increases in conductivity or does both.

While most types of nondestructive tests present only one piece of data, such as the intensity of transmitted radiation or a pattern in powder, eddy currents can present two. These are the resistance, R, and the reactance, X, of the pickup coil. This leads to a two-dimensional rather than a one-dimensional analysis. A direct functional relationship exists between R and X, on the one hand, and the amplitude and phase of the measured voltage, on the other.

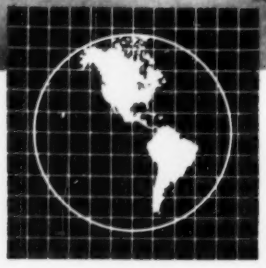
The measured voltage depends on the magnetic field; the field depends on the eddy currents. And the currents vary with the dimensions and conductivity of the test piece, and the shape, size, and position of flaws within it.

The block diagram shown in Fig. 2 is typical of a new group of eddy-current instruments developed by F. Förster in Germany. An oscillator-amplifier supplies a constant frequency current to exciting coils A and B of the test coil system. The net output signal of pickup coils C and D is amplified and then fed into a phase-amplitude-sensitive detector. A reference channel, energized directly from the oscillator, gives two reference voltages separate in phase by 90° but adjustable relative to oscillator output.

Two ring-modulated phase-sensitive detectors measure the amplitude and phase relations of net pickup-coil output voltage. Meters, alarms, or automatic rejection relays can be attached to quadrature-phase and in-phase detectors.—Control Eng, Oct, p35

EDITOR'S NOTE: This is the first feature article digested from Control Engineering, a new McGraw-Hill publication. For a discussion of the new magazine's editorial coverage, turn to p. 48.

Two W&T Air Operated Master Chlorinators in the Lerma project, Mexico City



Internationally Dependable...

...W&T Equipment for the COMMUNITY

Through the years, and in many countries throughout the world, Wallace & Tiernan processes and equipment have contributed to the protection of community life.

Mexico City, the capital of Mexico, is an excellent example of how a civil administration, with the aid of W&T equipment, helps to safeguard the health and welfare of its citizens.

Recognizing that the availability of a safe water supply is a major responsibility to its community, the Mexican capital executed the fabulous Lerma project. Completed recently, after nine years of construction, at a cost of $25,000,000, this new project is capable of supplying 1,584 gallons of water per second. Water is brought from the headwaters of the Lerma River to storage tanks outside the city through an aqueduct which includes some seventeen tunnels.

Two Wallace & Tiernan Air-Master Chlorinators are installed in the Lerma project to insure adequate sterilization.

Wallace & Tiernan Chlorinators are well known internationally for dependable, economical performance. W&T's successful performance in the Lerma project is typical of the thousands of other installations all over the world.

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AGENTS IN MOST COUNTRIES

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Liquid Fuel Reactor Offers Cheap Power

Steam at about 1,000° F. is predicted from a new liquid-metal fuel reactor system proposed by Brookhaven National Laboratory scientists. The LMFR system thus approaches steam conditions of many modern thermal plants, making fission heat more competitive with conventional fuels. It also promises both lower capital and operating costs.

As fuel, LMFR would use a liquid-metal solution or dispersion of U^{233} and it would breed U^{233} from thorium. Through heat exchangers, the liquid uranium-thorium fuel would transfer its heat to a secondary coolant (sodium) and thence to steam.

Specific advantages of LMFR over other reactor designs include:

1. High specific power.
2. High-temperature operation and thus high thermodynamic efficiency.
3. Neutron economy sufficient to give some breeding, with resulting low fuel costs.
4. Simple construction.
5. Easy fuel handling by pumps.
6. Cheap chemical processing to remove fission products.
7. Lack of radiation damage to liquid-metal fuel.
8. Unlimited burn-up of fuel.
9. Removal of relatively fresh fission products in concentrated form.—Elec World, July 19, p47

Biggest Locomotive

Steam-turbine-electric No. 2300, largest single-unit locomotive ever built, started tests on Norfolk and Western railway's system. With tender, it is 161½ ft. long and weighs 586 tons, including 20 tons of coal and 22,000 gallons of water. Maker was Baldwin-Lima-Hamilton.

The 2300's new-type high-pressure, high-temperature steam generating equipment delivers steam at 600 lb. per sq. in. and 900°F. to a geared turbine unit. Latter develops 4,500 hp. at the electric generator supplying power for the traction motors. Maximum speed: 60 miles per hr. Its high thermal efficiency may provide the answer to oil as transportation fuel.—Railway Age, July 26, p30

New Electrolytic Process May Cut Titanium Cost

A new electrolytic process for making titanium, the "wonder metal" with a brilliant future in the aircraft and other industries, will soon be introduced by Horizons Inc., a Cleveland, Ohio, research organization.

The new process begins with a steel cell that looks something like a hot-water boiler and is lined with graphite. A pair of electrodes are dropped into the cell: one of graphite, the other of iron. The electrolytic solution is potassium titanium fluoride and salt. Inert argon gas blankets the solution and prevents titanium in the solution from reacting with foreign elements. When a direct current is passed through the solution, titanium in metallic form is deposited on one of the electrodes.

The process differs from the expensive "Kroll process" now being used to turn out titanium on a limited scale in the U.S. (McG-H Digest, Aug, p7). It may lead to a cut in present high titanium prices of $4.72 per lb.—Business Wk, July 31, p122

Milling Cutters Welded

Special fixtures, correct welding equipment, and a skilled welder return cracked or broken milling cutters at Temco Aircraft Corp. to service the same day they are damaged. Result: great savings, particularly when one cutter of a matched pair is broken.

C-clamps hold cutter pieces to a disk of surface-ground boiler plate for tack-welding in two places with an electrode of high-alloy tool steel. The cutter is grooved on each side of the crack, then preheated to 700°F. on a fixture made of steel rings with outside crosspieces drawn down tightly on the cutter (like a sandwich) by nuts and bolts.

Welding is done with the cutter still in the fixture. To avoid further cracks, welding is done from the hub out, on both sides progressively, with the arc at the center of the groove. After welding, which takes about 30 min. on a 10-in. cutter, the cutter is normalized and the weld ground flush.—Am Mach, Aug 30, p125

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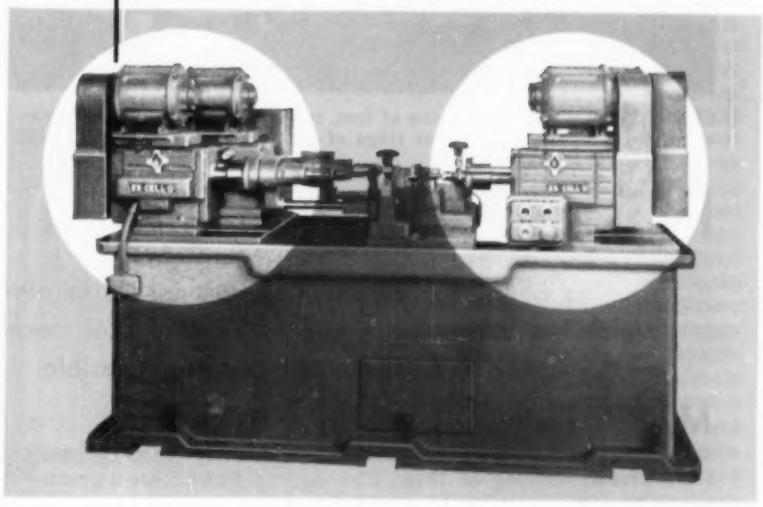

Four of Ex-Cell-O's famous quill-type Hydraulic Power Units drive the tools of the high-production machine shown above. This is one of many machines *built at very low cost* with Ex-Cell-O Power Units. All unit quills are advanced and can be retracted simultaneously from the central control station.

With one or more of these Ex-Cell-O Units, many kinds of modern automatic machines for drilling, reaming, counterboring, and spot-facing are now being built.

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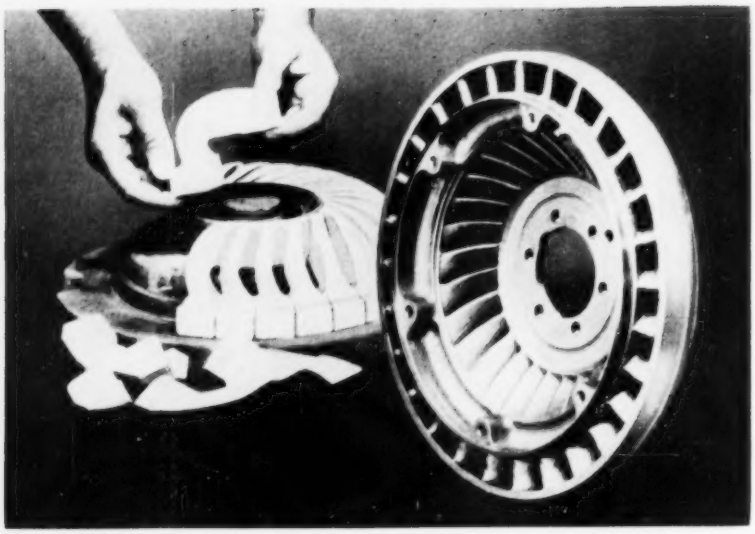

COMPOSITE MOLD—outer ring of iron, center web against dry-sand core, and vanes between outer and inner rings of plaster—casts torque-converter part

Plaster-Cast Aluminum

Casting aluminum and magnesium alloys in plaster molds has expanded their design potentials because of the highly desirable properties now possible

MANY NEW USES for aluminum and magnesium castings stem from plaster casting of these alloys. The plaster technique, improved by considerable research at the Aluminum Co. of America, permits the casting of sections to thicknesses of $\frac{1}{16}$ to $\frac{1}{4}$ in., excellent surface finish—125 micro-in. rms. or better, and dimensional tolerances closer than those associated with sand and permanent-mold methods.

Making a plaster mold is simple. The plaster is prepared as a liquid slurry and poured around the pattern or into a core box, instead of being rammed like sand. When the plaster hardens, it can be drawn and handled as it forms a self-supporting body.

Although plaster casting is not new, the Alcoa technique introduces a new characteristic—high permeability of the plaster. This property permits the escape of gases generated when molten metal is poured into the mold.

The plaster, also as a result of the cellular structure, is a good heat insulator. Thinner sections can therefore be poured than is possible with sand or iron molds, both of which have a greater chilling effect.

In plaster casting, duplicate pattern equipment is often necessary because patterns and core boxes are tied up while the plaster hardens. This problem was solved by using plaster and rubber materials to duplicate the shapes. They draw freely; when the plaster expands slightly on setting, there is no binding.

Tolerances—Dimensional tolerances to be specified in casting design depend on a number of factors, including equipment available, time allowed, number of pieces required. But, in general, the following rules may serve as a guide:

1. Tolerance across parting line: ± 0.010-in. for 1 in. or less; above 1 in., add 0.001 in. to tolerance per inch of length.

2. Tolerance between points on one part of mold: ± 0.005 in. for 1 in. or less; above 1 in., add 0.001 in. per inch of length.

3. Tolerance between points on core and mold: same as across parting line.

4. Maximum length of core supported at one end: core diameter times five.

5. Draft: 0° permissible in many cases; 2° desirable as larger draft may lower production cost.

6. Minimum core diameter: $\frac{1}{4}$ in. for separate cores.

7. Minimum section thickness: $\frac{1}{16}$ in. for section of 3 in. or less; $\frac{3}{32}$ in. for 3 to 6 in.; $\frac{1}{8}$ in. over 6 in.

8. Minimum radius: sharp corners can be cast when desired.

Mechanical Properties—Aluminum and magnesium castings designed for the plaster process develop mechanical properties similar to sand-cast parts. Specifications usually require that average tensile strength for specimens cut from castings should be not less than 75% of minimum requirements for separately cast bars.

Castings with section thicknesses of $\frac{1}{2}$ to 1 in. have lower properties than when sand-cast. But such castings lend themselves to composite casting, in which plaster sections are used as components in sand or permanent molds. The surfaces that require smoothness and close dimensional tolerances can be formed in plaster elements, and other surfaces against sand or iron.

Current Uses—Bladed aluminum parts have been cast with considerable success in plaster molds. The plaster allows casting of thick and thin sections adjacent to each other, such as thin blades leading into heavy hubs.

An outstanding example is a double-bladed casting in which blade thickness varied from 0.040 to 0.100 in. with the distance between each pair of twin blades about 0.045 in. This part formerly had to be made by assembling the blades in the housing and then brazing.

Castable Alloys—Aluminum and magnesium alloys suitable for sand-casting can be cast in plaster or composite molds. Aluminum-silicon alloys are best for fine detail and thin sections. Aluminum-silicon-magnesium and aluminum silicon-copper alloys are particularly suitable for plaster or composite molds.—Prod Eng, Sept, p164

Mr. Transport Chief–

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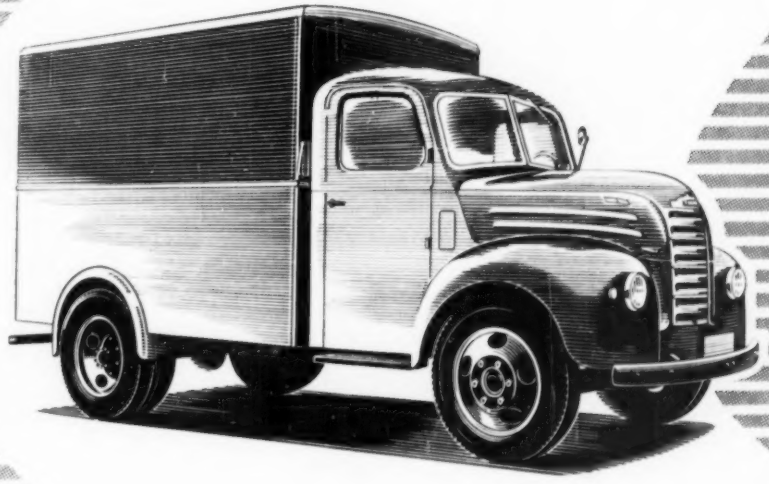

FOR 4-5 TON LOADS, rely on the Thames V-8, and be *right*. Right for power, right for toughness, right for economy. To suit your own preferences and needs, you have the choice of two magnificent engines: the powerful, fuel-thrifty 85 b.h.p. V-8, or the famous P.6 Diesel.

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Ask your dealer for details of the Thames 'Cost-Cutter'; it has the right power for 2-3 ton loads, and will save you money by the mile.

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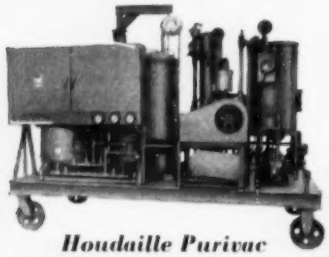
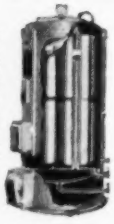


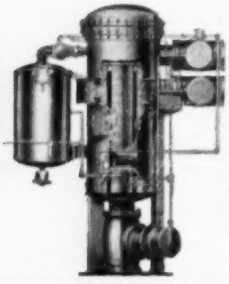
Houdaille Purivac

Purifies, dehydrates and degasifies insulating oil in one automatic operation. Operates in the field (while electrical equipment is in service) or at a central station. Eliminates transformer cleaning, reduces corrosion and deterioration of fabric insulation, restores dielectric strength of oil.

purifiers

Available in many types and sizes to provide needed range in capacity. Use bulk refill or handy, interchangeable cartridges. Remove all types of contamination including dirt, sludge, acids and products of oxidation.





clarifiers

Automatic or mechanical units meet all filtering requirements of small or large central coolant systems. Remove abrasives and other solids from oils and coolants used in grinders, broaches, boring machines, etc.

WARNING

Industrial skin accidents cause more lost time than broken bones.

It's a waste of time to preach safety in your plant and at the same time neglect to protect your employees from skin hazards caused by oils, acids and alkalis. You risk lost production, costly claims and good employee relations.

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Molded Silicone Rubber Makes Largest Gasket

One of the largest silicone-rubber window gaskets ever made has been molded for the Climatic Laboratory of the U. S. Army Quartermaster and Development Center. Inside dimension of the gasket is 24x24 in., the channel is 4¾ in. deep, and cross-sectional thickness is ¾ in.

Specifications required that the finished gasket stretch over and provide a tight seal around a Thermopane window set in a metal frame. The material would allow it to remain operative and retain its full sealing efficiency over a wide temperature range extending from sub-zero artic cold to torrid tropical heat.

The material selected for the job was Silastic #152, made by Dow Corning Corp., Midland, Mich. It met all specifications.

The gasket was molded in a single-cavity, one-piece mold. Seven days were required to accomplish full cure, using an oven specially built for this project and employing step-grade temperature increase techniques.—Mod Plastics, Aug, p175

Polar "Sky Compass"

A new "Sky Compass" for accurate aerial navigation in polar regions above 70° latitude determines an aircraft's true heading by finding the sun's position when it is below the horizon. This it does by using the polarized light in the sky when the sun is not visible.

To operate the polar compass, designed by Kollsman Instrument Corp., the navigator rotates it as he looks through an eyepiece. The light intensity in the pattern of an analyzer varies until the compass is pointed toward the sun's azimuth. When this happens, the pattern disappears and the optical field becomes a solid gray—the "match point." Then the navigator reads the plane's true heading from a scale.

The device is especially useful in far north and far south regions because of protracted twilight when the sun is below the horizon.—Aviation Wk, July 26, p37

Six Devices Proportion Liquids Automatically

Every continuous chemical process needs accurate proportioning. Ingredients must be fed into the process in the proper ratio. Six types of equipment are available for proportioning liquids automatically. Before you decide which system you want, ask yourself these questions: "What kinds of liquid am I handling? What accuracy do I insist on? And how much am I willing to spend?"

Pot Feeder—A restriction is placed across the primary flow line. A secondary flow system enters the primary line ahead of the restriction and exits behind it. The secondary flow system consists simply of a valve and a pot. The differential across the restriction carries the contents of the pot into the main line. Features of the feeder: low cost, simple operation. It is used where proportioning is not critical.

Decanter—A swing pipe or outlet line is lowered into the solution tank at a required rate. It is low cost and simple to operate.

Plunger Pump—Fluid displacement is constant for each stroke of a reciprocating plunger. The pump is suitable for use against high pressure. It is accurate to ±1%.

Diaphragm Pump—Fluid displacement is constant for each stroke of the diaphragm. It is suitable for use against high pressure and is accurate to ±1%.

Fluid-Driven Pump—A fluid alternately applied to either side of drive piston provides stroking. Stroking speed is constant.

Loss-in-Weight—Balanced tank scale poise is retracted at a desired rate. Accuracy of this feeder is ¼% by weight, independent of temperature, density and viscosity. —Control Eng, Sept, p68

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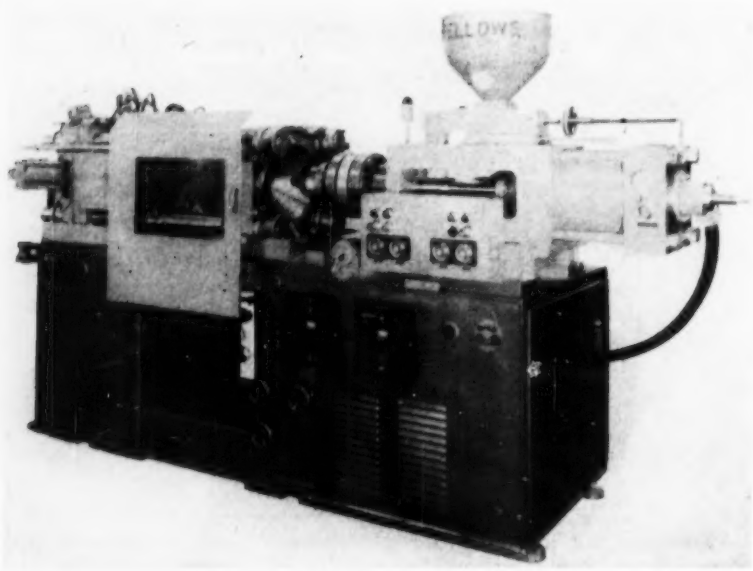
NEW PRODUCTS



Injection Molding Machine Features Automatic or Semiautomatic Operation

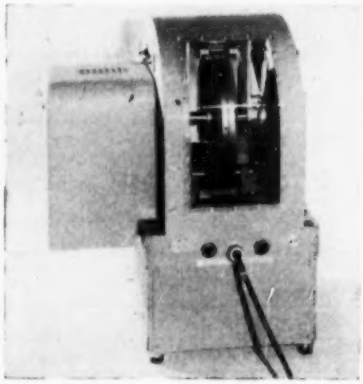
New 6-oz. injection molding machine, model 6-200, can be operated either automatically or semiautomatically. Selection is made by a lock-type selector switch. Rapid advance injection and stroke adjustment on both injection and press ends provide for small machine production rates on thin and shallow parts up to 690 cycles per hr.—dry run. With full injection stroke and 9-in. press stroke, 450 cycles per hr. are possible.

One-piece construction of the heating-cylinder center section provides direct heat conduction to the torpedo and full 75-lb.-per-hr. plasticizing capacity. External tie rods, arranged to allow quick heater band and cylinder change, add to ruggedness of the machine.

Dies can be quickly changed because of the one-point planetary die-height and clamp adjustment. A hinged hopper and a "lift-out" feed mechanism allow rapid and easy color and material changes.

Operating parts of the machine are readily accessible. The hydraulic-electric interlock safety doors are spaced far enough from the platens to provide access for hose connections and accessory equipment.

Optional equipment includes the pre-pac, or stuffing, attachment. This gives up to 40% more styrene by weight or larger shots of limiting materials such as reground polyethylene. — **Fellows Gear Shaper Co., Springfield, Vt.**



Memory Device for Gaging

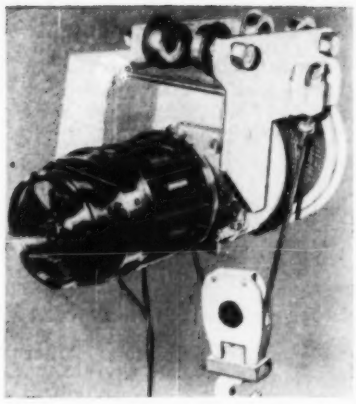
Processing lines that need the storing of meter readings and reproducing of that information at a later time will be aided by the Proportional Syncronizer. This device consists of a memory unit to which the meter reading is applied through a self-balancing electronic control circuit. The memory unit is driven from the process line in direct relation to the speed of the material being processed.

The device can aid such processes as tube forming, coating of materials, and similar ones requiring precise control. In tube forming, the welding current must be varied with changes in steel-strip thickness. So the strip is measured before forming, and the Proportional Syncronizer conveys the information between point of measurement and point of welding and releases it at the right moment to control the welding current.— **Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford 1, Conn.**

Portable Fire Pump

Fire departments will find a new pump, powered by an 8½-hp. gasoline engine, highly useful. It is easily carried, being mounted on a steel base. Weight is only 160 lb.

The pump can relay enough water through 300 ft. of 2½-in. hose and up a 75-ft. hill to supply a pumper operating two ½-in. nozzles at a pressure of 100 lb. per sq. in. It can deliver 100 gal. at a pressure of 80 lb. per sq. in.—**Marlow Pumps, Ridgewood, N. J.**

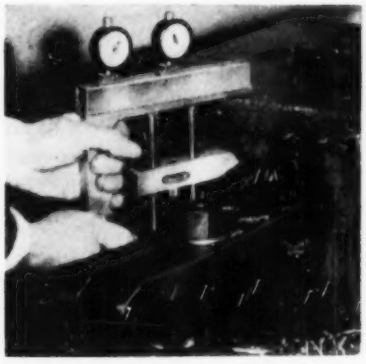


Electric Hoists Equipped With Special A-C. Motors

New line of electric hoists ranges in capacities upward from 4 tons. They are equipped with alternating-current motors and gear-reduction units developed by LeTourneau for use on its other, heavier equipment.

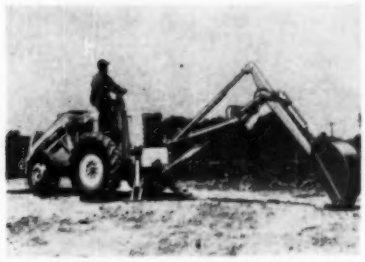
The motors operate from 220 or 440 volts. They are single-speed squirrel-cage motors with rotor circuits completely outside the stator windings.

Standard 4-, 5-, and 6-ton hoists have wire rope lift, with swivel hook suspended on a two-part line. Hoist suspension is by lug, hook, or trolley—plain or geared. Near end of the motor shows the exterior of the bimetallic, cone-type brake, which is released automatically when the hoist is started in either direction. Limit switches are optional.—**R. G. LeTourneau, Inc., Longview, Texas.**



Portable Hardness Tester

Riehle tester is offered in two sizes: model PHT-1 for specimens up to 4½ in. in dia. and model PHT-2 up to 12 in. They employ standard Rockwell indentor and loadings, offer scales A to G, and can test both inside and outside surfaces. — **American Machine & Metals, Inc., 233 Broadway, New York 7, N. Y.**



Fast Trench Digging

Unusual back-hoe, designed specifically for the Hough Payloader, combines high digging power with fast retracting action to speed up the entire cycle. A "wrist-action" bucket helps speed the cycle, since hoe does not have to go through complete cycle on all operations.

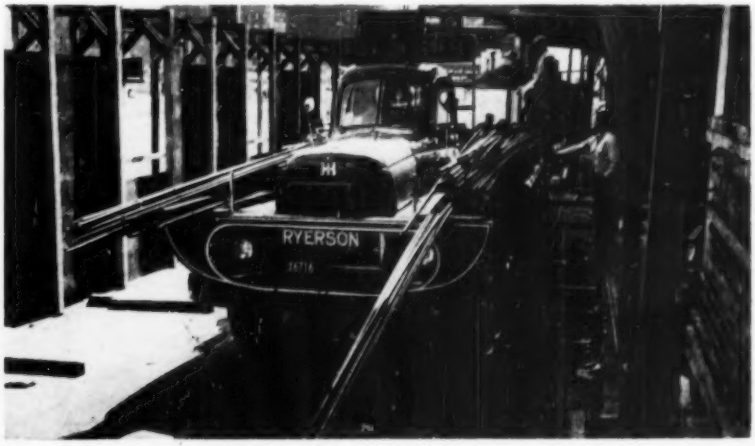
Boom design and bucket action allow digging of vertical bell holes, vertical side walls, square corners. The back-hoe can dig trench and dump spoil at any radius to 190° —**Wain-Ray Corp., Hubbardston, Mass.**

Lift Truck-Trailer

The Hyster 2000-lb. capacity lift truck can now be carried behind a transport truck in a special trailer, built by Utility Trailer Sales Company, San Francisco. The lift truck-trailer combination affords speedier moving and storing of loads at any points on the transport truck route, thereby permitting expanded truck schedules.

On its initial trial the lift truck loaded and unloaded 36 pallet loads in 2 man-hours.

After loading of the transport by the lift truck, the latter is driven onto the trailer over a hinged ramp which serves as a tailgate while traveling. Upon the transport's arrival at its destination, the lift truck is driven from the trailer and used to unload material quickly without additional manpower.—**Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.**



Centered-Cab Truck Handles Long Lengths

One-man cab, centered on the truck body, permits balanced carrying of lengths of steel, pipe, or lumber longer than the over-all length of the truck itself. The cab is available on medium- and heavy-duty International four- and six-wheel trucks. Along each side of cab, there is space for objects up to 21 in. wide. An outrigger supports the load in front of the truck. When both cab doors are blocked by loads, a roof hatch allows driver entry or exit.—International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill.

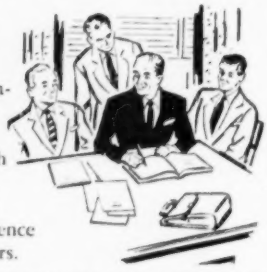
For a better accounting department ask the man from Remington Rand to take these 3 important steps for you

1. Study

When a Remington Rand representative studies your accounting procedures, you can be sure nothing important will miss his eye. He knows just what to look for, and where to find it. Should his ability to put his finger on the source of your trouble seem uncanny, remember—your Remington Rand representative has been carefully trained for this job, and he's been working at it for years!

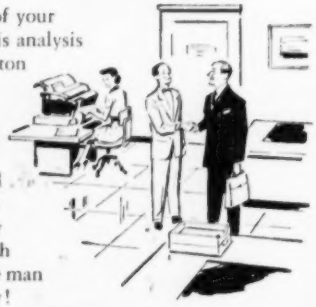
2. Analysis

Your Remington Rand representative has another valuable asset to put at your disposal. In analyzing your problem he draws upon a rich reservoir of business experience. Experience gleaned from literally thousands of case histories. Experience accumulated over a span of 80 years.



3. Recommendation

After completing his study of your accounting operation, and his analysis of the findings, your Remington Rand representative is prepared to make recommendations. You can follow these recommendations with confidence. They'll produce a degree of efficiency and economy achievable only through long familiarity with business science. Send for the man from Remington Rand today!



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couples efficiency with economy . . . does all these jobs: payables, receivables, payroll, general ledgers, cost distribution, sales analysis, inventory. What's more, it switches from one job to another in seconds. Keyboard is completely electrified, and can be mastered by any competent typist in just half an hour.

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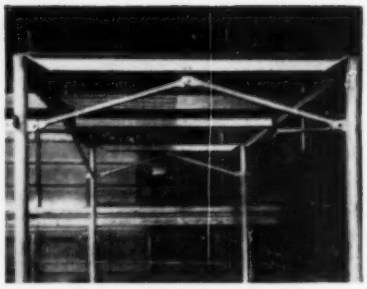


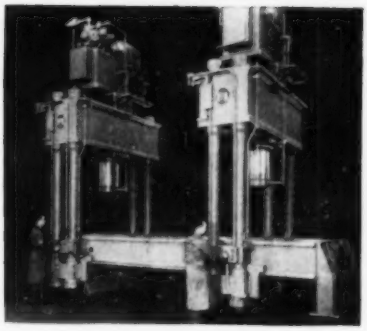
Storage-Platform System

Standardized supporting structure provides storage platforms or working areas by dividing available height and thus doubling available floor space. It consists of tubular columns resting in base plates, beams, bracing tubes, wedges, handrails, and open steel or aluminum flooring. The system can be applied to meet varying conditions—loads per square foot, heights, and grid dimensions. The structure shown in the illustration is 8 ft. high and 8x8 ft. in grid area.—**Fisher & Ludlow Ltd., Bordesley Works, Birmingham 12, England.**

New Truck Adds Power

New series of one-ton trucks and utility vehicles has 53% more power than previous Willys models. The new vehicles, all powered by six cylinder engines, include a pick-up truck, a six-passenger station wagon and a half-ton delivery truck.

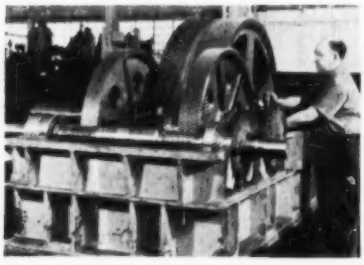
All models feature 4-wheel drive and the 1-ton truck can be obtained in four different stages to meet individual requirements: (1) chassis only, (2) chassis with cowl, (3) chassis, cowl and windshield, and (4) truck complete.—**Willys-Overland Export Corp., Toledo 1, Ohio.**



Straightening Press

Two-way straightening press is believed to be the first hydraulic press with two pressure units. It is designed to straighten forgings, castings, extrusions, and weldments on which it is necessary to hold down one point while applying pressure to another point or to apply pressure at two points at the same time.

The two units can be moved both longitudinally and cross-wise to apply pressure where needed. Each unit has a 400-ton capacity. The bed is 264 in. long by 96 in. wide. Ram stroke is 24 in.—**Hydraulic Press Mfg. Co., Mount Gilead, Ohio.**



Large Speed Reducers

Single-reduction and double-reduction speed reducers (types WSH and WDH) make up a new line for use in heavy industry. They provide economical transmission of power from prime mover to driven machine.

The design incorporates compact, rigid gear cases; precision gears and pinions; antifriction bearings. Thirteen standard ratios from 2.24 to 9.21 are available for type WSH and sixteen ratios from 11.3 to 70 for type WDH.—**Westinghouse Electric International Corp., 40 Wall St., New York 5, N. Y.**

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Severe fatigue tests were made on the three tires shown to compare their wear resistance. Each tire was tested on an overloaded lift truck that was operated at top speed for a fixed time interval. Tires "A" and "B" were too damaged for normal use . . . the Mono-Cushion wore evenly and had a useful service life after testing. All tests were made in one day over the same test track. WRITE FOR BULLETIN TD-200 FOR COMPLETE TEST DATA.

Many export buyers have had experience with the outstanding performance of tires by MONARCH. To meet the growing demand, MONARCH is establishing dealerships around the world. Franchises are available to experienced agents who sell materials handling equipment. Write for information and send details on sales experience, list of products currently handled, and references.

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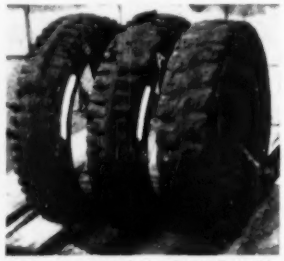

ONLY MONO-CUSHION SURVIVED the tests in usable condition. Unretouched photo shows comparative results.

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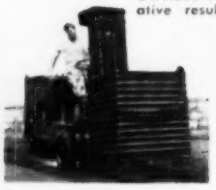

MONARCH TIRES ARE PERFORMANCE-PROVEN DAILY ON LIFT TRUCKS AROUND THE WORLD

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NEW PRODUCT BRIEFS

Deep Well Blasting — Self-contained, charged, nonsparking torpedo tube is announced for blasting deep oil and gas wells. Saf-T-Pak tubes, made in two sizes, are claimed to reduce shooting costs.—**American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.**

Dairy Equipment Cleaner — Raydex, a granular alkaline formulation, is designed as a fast, low-cost, heavy-duty cleaner for dairy and food processing plants and equipment. It is completely free of abrasives and insolubles.—**Pennsalt International Corp., 1000 Widener Bldg., Philadelphia 7, Pa.**

Magnetic Agitator Separator—Non-electric unit separates metals having a magnetic content of 20% or more. It combines agitator feeder with a magnetic pulley. Uses: to separate media employed in grinding, polishing, and tumbling operations.—**Eriez Mfg. Co., Erie, Pa.**

Tractor Glow Plug—All-weather electric starting is now available on Caterpillar D4 tractor. The glow plug is a heating element, about the size of a lead pencil, that extends into the precombustion chamber of the diesel engine. When activated by battery current, it heats to 1800°F. in 30 sec., makes engine starting easy.—**Caterpillar Tractor Co., Peoria, Ill.**

Industrial Casters—Neoprene seals on series 5200 casters increase life and cut maintenance time and expense by keeping lubricant in raceways, dirt out. Five types of wheels are available with load capacities to 1,200 lb. per caster.—**Rapids-Standard Co., Inc., Grand Rapids, Mich.**

Precision Switch—Model IHTI Microswitch is designed for high-temperature use. It can switch substantial electrical load from —50° to 1000°F., making it well suited for aircraft, vulcanizing plants, and other such industrial uses.—**Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. S., Minneapolis 8, Minn.**

MANAGEMENT REPORT

What would you do if your plant's union asked to be appointed a major wholesale outlet for your product? Kaiser Motors Co. said, "No," when its union, a United Automobile Workers branch, asked to be franchised as Ohio State distributor of Kaiser-Willys cars. Its reason: Such a project might involve UAW in setting management policy.

The unusual UAW request had an unusual sequel. In subsequent negotiations, the union got one of Kaiser's biggest independent distributors to turn over the Toledo, Ohio, dealership to a union-backed company. Result: the new firm will be selling KW cars right out of the factory showrooms.

As for management, Kaiser Motors had little to say beyond pointing out that the company was not directly concerned. Meanwhile the union pushed ahead with business-boosting ideas. Example: A payroll deduction plan for workers large enough to meet car installment payments or to build up a down payment.

A broom, dustpan, bag of dirt, and 40 quart bottles of water figured symbolically in an elaborate 20-ft. window display at the First National Bank and Trust Co., Paterson, New Jersey.

Along with these props, there were various air-conditioner models and display cards pointing out that "40 quarts of moisture can be removed from room air every 24 hours" and that an air conditioner "removes 98% of suspended dust, pollen and soot from the air."

The exhibit grew out of the bank's belief that, by helping sell merchandise of local stores, it would sell its own services. The tie-up between manufacturer, merchants, and bank was effected by a card listing local dealers and announcing that purchases could be financed at the bank.

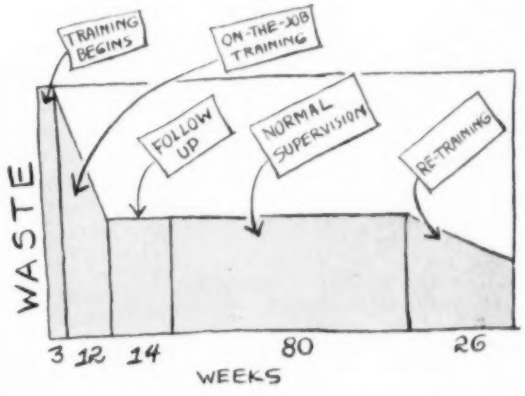
A 2-week display for any one product is customary at First National. But the dramatic display of year-round air conditioning was so successful in pulling visitors that it was extended to 4 weeks.—Elec World, Sept 6, p134

Sometimes "most management" is not the best management. Look at Chatwood Safe & Engrg. Co., Ltd., a 1,000-man English firm making safes, steel partitions, and special machinery. Five years ago, it tossed out "scientific management" and saved $15,000 a year in paperwork alone.

First change was to cut out overhead by considering the worker as the most important person and having each management level help the one beneath it. There are no planning or personnel departments, rate fixers, maintenance foremen, or time clocks. The foreman runs his own department, with such specialists as he wants. Each foreman hires and fires, orders his own material, and, in fact, operates as a subcontracting business.—Am Mach, Aug 16, p157

High temperatures and high humidity in working areas can cause workers to run high pulse rates, even fevers. The results are greater fatigue and complaints about working conditions. Air conditioning, of course, could cure these conditions, but it is often impractical to air-condition such areas in most plants.

But managements can raise production and lower employee absenteeism and turnover by providing air-conditioned rest areas. Rest periods throughout the day under controlled temperature and humidity conditions enable workers to recover more rapidly. Pulse rates fall considerably faster in air-conditioned areas. Also air movement through working areas reduces the heart rate.



Among plant-management officials it's generally believed that changes in employee behavior are short-lived. After the initial boost provided by a training program, workers soon revert to their old habits. Fieldcrest Mills, Inc., disagrees.

For over 2 years, Fieldcrest studied the effects of training in waste reduction on four "tailing" operators in a cotton mill. After 10 preliminary weeks of observation to be certain of their normal conditions, the workers were given a total of 29 weeks of training. At the end of the first 15 weeks, waste had been cut 62%. It stayed at this level until the end of the full 29 weeks.

The significant fact is that with no further training (only normal supervision) the results persisted for 80 more weeks. Then training was re-introduced for another 26 weeks. Result was a further drop in scrap loss of 45%.—Factory, Sept, p132

NEW FREE CATALOGS

Continuous Gas Analysis—Bulletins describe combustible-gas alarms, carbon monoxide and oxygen recorders, and infrared gas and liquid analyzers. —Mine Safety Appliances Co., Intl. Div., 201 N. Braddock Ave., Pittsburgh 8, Pa.

Aluminum Paint—Literature is available on complete line of powders and pastes used in the manufacture of aluminum paints.—Reynolds Metals Co., Export Div., 19 East 47th St., New York 17, N. Y.

Crushing and Screening—Complete information is available on gyratory crushers, cone crushers, vibrating bar grizzlies, and rod deck screens.—Nordberg Mfg. Co., Milwaukee 1, Wis.

Molding Machines—Complete specifications on Watson-Stillman plastics molding machines, equipped with preplasticizing units, is given in bulletin 620-G8.—Export Dept., Watson-Stillman Co., 150 Aldene Rd., Roselle, N. J.

Power Saws—Descriptive literature is available on the all-purpose DeWalt wood-working saw.—American Machine & Foundry Co., DeWalt Products Div., 261 Madison Ave., New York 16, N. Y.

Electronic Equipment—Detailed information is available on Mariner Pathfinder Radar, Fathometer Echo Depth Sounders, and Marine Radio Telephones.—Raytheon Mfg. Co., Intl. Div., 589 5th Ave., New York 17, N. Y.

Machining with Stellite—Complete information about Deloro Stellite Grade 100 cutting tools is given in booklet, "Machining with Deloro Stellite."—Deloro Smelting Co. Ltd., Deloro, Ontario, Canada.

Hydraulic Power Units—Quill-type hydraulic power units for use with high-production machines are covered in detail in bulletin 45828.—Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

About Glass—Illustrated booklet tells you about glass and how it might help your business. It is called "GLASS, its increasing importance in product design."—Corning Glass Works, Export Dept., 718 Fifth Ave., New York 19, N. Y.

Industrial Machinery—An illustrated review gives information about one of West Germany's leading engineering firms and its many products.—Machinenfabrik Augsburg-Nurnberg AG, Augsburg, Germany.

Office Duplicating Process—Booklet contains detailed information about a new short-run duplicating process called Azograph.—A. B. Dick Co., 5700 W. Touhy Ave., Chicago, Ill.

Generators—Booklet Ex 2164e contains information on generators for diesel power stations.—Allgemeine Elektricitats-Gesellschaft, Berlin, Germany.

Machine-tool Attachments—Catalog 5321 contains information on machine-tool attachments and accessories.—South Bend Lathe Works, South Bend 22, Ind.

Liquid-level Control—Bulletin 1160 describes 12 different systems for measuring and controlling liquid level. —Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. S, Minneapolis 8, Minn.

Packaged Air Conditioner—Bulletin C-1100-B49 illustrates parts and operation factors about new packaged air conditioner and also gives dimensions and capacities.—Worthington Corp., Harrison, N. J.

Gyratory Crushers—Engineering features of "Superior" primary and secondary gyratory crushers are described in bulletin 07B7870.—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Organic Acids—Booklet, entitled "Organic Acids," discusses in detail eight organic acids, giving their physical properties, specifications, and constant boiling mixtures.—Union Carbide International Co., 30 East 42nd St., New York 17, N. Y.

Milling Machine—Complete information on type BG-21 Keller tracer-controlled milling machine is given in circular No. 565.—Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford 1, Conn.

Ethyl Cellulose—Booklet contains formulations for ethyl cellulose lacquers, as well as information about solvents and stabilizers used in ethyl cellulose coatings.—Hercules Powder Co., Wilmington, Del.

Geared Flexible Couplings—Folder 2375 gives detailed descriptions, dimensional tables, and selection data about new line of geared flexible couplings for high-speed and high-torque applications.—Link Belt Co., 233 Broadway, New York 7, N. Y.

Valves—Catalogs 101 and 201 contain complete information about freon and ammonia valves and accessories.—Henry Valve Co., 3215 North Ave., Melrose Park, Ill.

Panel Instruments—Bulletin GEC-368F contains description, construction, and application details of both direct- and alternating-current panel instruments.—International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Industrial Gas Trucks—Bulletin 5013 describes and pictures the new G-52 series of gasoline fork lift trucks.—Yale & Towne Mfg. Co., Materials Handling Div., Roosevelt Blvd., Philadelphia 15, Pa.

Zirconium—Booklet, entitled "Facts About Zirconium," is a concise compilation of information about the history and production of zirconium.—Carborundum Co., Niagara Falls, N. Y.

Materials Handling—Bulletin 1360 describes and illustrates the Traveloader —unique side-loading lift truck designed to handle long, bulky loads.—Baker-Raulang Co., 1230 West 80th St., Cleveland 2, Ohio.

Screw Pumps—Construction features and details about screw pumps are given in Bulletin WQ-S205.—Warren Steam Pump Co., Inc., Warren, Mass.

Water Power Equipment—Bulletin No. 151 symbolizes 75 years of successful experience in the manufacture of hydraulic turbines and related equipment. Bulletin records this achievement in pictures rather than words.—S. Morgan Smith Co., York, Pa.

Heavy-duty Trucks—The International 4- and 6-wheel 400 series heavy-duty conventional highway-model trucks are described in catalog E-71-D.—International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill.

Sintering Process—Full details of the Dwight-Lloyd sintering process for producing high quality, lightweight aggregate at low cost, are given in Bulletin 151.—Dwight-Lloyd Inc., 322 Sinter Ave., Netcong, N. J.

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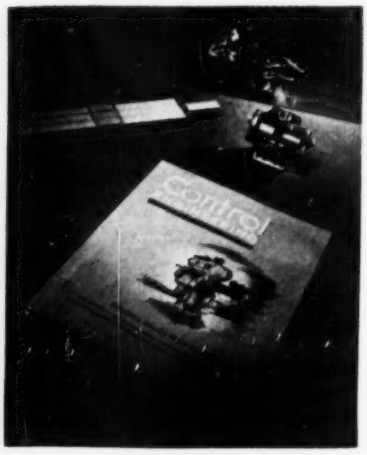
Here's Another Magazine We Digest

For Control in Industry

CONTROL ENGINEERING, the newest of McGraw-Hill's 38 magazines, serves a new breed of engineer. Since the end of the war, the science and technology of automatic control has expanded at a steadily increasing rate, leading many people to talk in glowing terms of the "second industrial revolution." New tools and methods of control technology have developed so fast, and in such wide diversity, that they have enormous untapped potential throughout all phases of industry.

After studying for 10 years how best to serve this new field, McGraw-Hill launched *Control Engineering* with the September 1954 issue. The new monthly is aimed directly at the common denominator of automatic control—the engineer who designs and applies the controls that regulate chemical processes, petroleum refining, power steering, the guiding of missiles, automatic piloting of airplanes, analog and digital computers, machining of metal, and countless other automatically controlled operations. It will report on this important new technology, both in a broad and a detail way.

Being aimed at the engineer, *Control Engineering* is basically a technical magazine. It offers its readers detailed explanations of new concepts, new ideas, and fresh



Control Engineering
A New McGraw-Hill Publication

techniques—written by experts and edited by a staff of experienced control engineers. Besides, it brings them news of their industry and their growing profession. The editors conceive of the new magazine as a clearing house for information in a field hitherto united only by the control-system approach to technological problems. Since the profession is new, a series of biographic sketches will introduce outstanding personalities in automatic control. In addition, *Control Engineering* plans to devote many pages to practical articles on the economic aspects of control.

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Simmons-Boardman Publishing Corp., 30 Church St., New York 17, N. Y.

American Builder
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Railway Age
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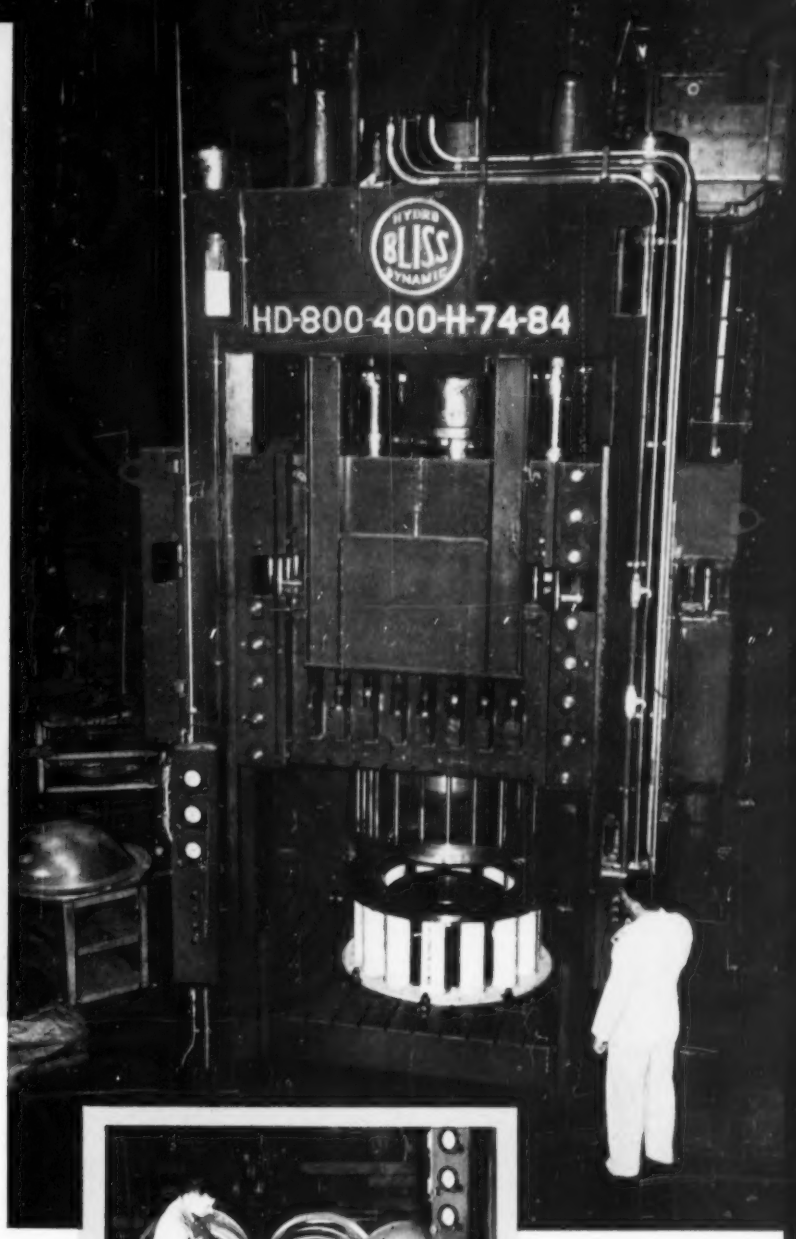
DOUGLAS AIRCRAFT LICKS A TOUGH ONE...

uses 800-400-ton Bliss Hydro-Dynamic Press to cut reject rate by 68%



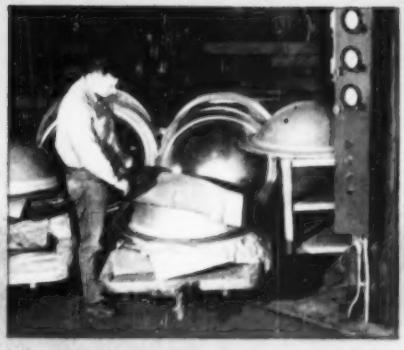
FACED with a better than 70% reject rate on 52-in. diameter aluminum shells, a west coast sub-contractor almost sunk the project and himself in the bargain.

The part required a difficult deep draw—and then halfway through the draw cycle—a stretch into the final shape. Despite the stretch, the wall had to be held to a close tolerance.

To solve the problem, Douglas and Bliss engineers collaborated on the design of a special Bliss Double-Action Hydro-Dynamic Press—one which has a 100% pin pattern on the blankholder to give positive holding pressure all around the blank. That feature, plus precision guiding of the slide and accurate tooling, did the trick . . .

Rejects were cut to less than 2%

You can expect results like that when you use the right press for the job. It may be a single-, double- or triple-action press. It may require a rubber pad set-up. It may be a standard or a special-purpose press. But no matter what your problem, you can be sure of impartial counsel from your Bliss press engineer. Bliss, world's largest manufacturer of presses, makes both mechanical and hydraulic—grinds no ax for either—only for the *one* proper press.



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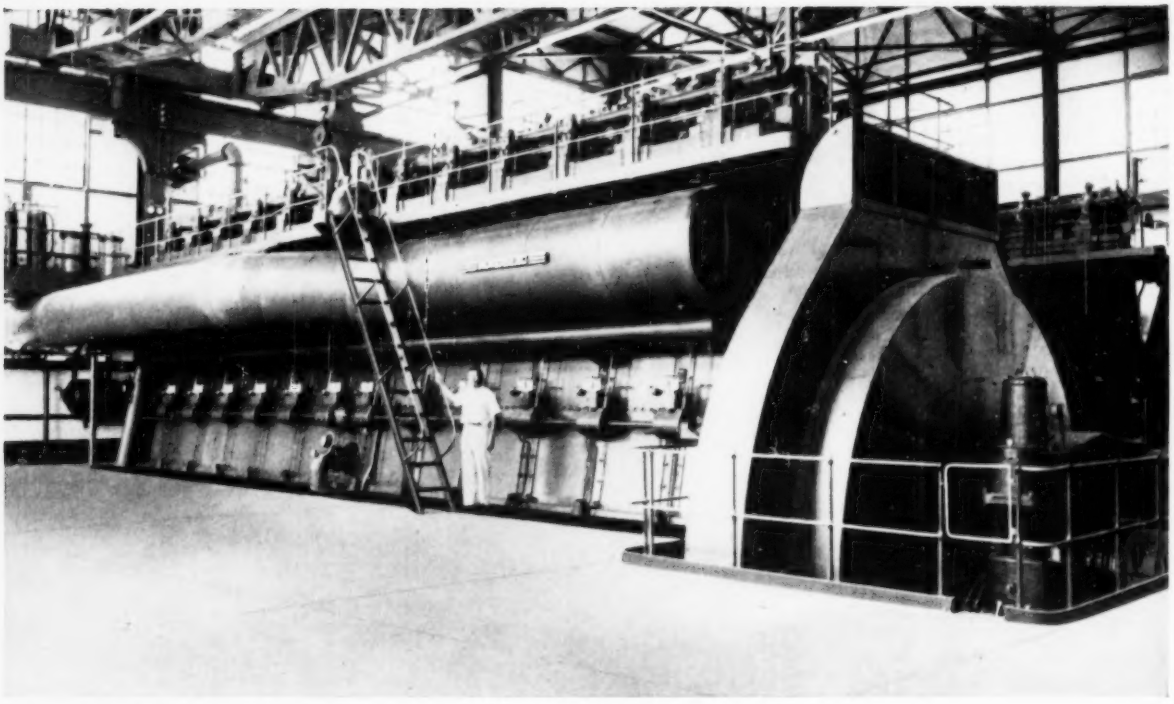

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Largest Diesels in Western Hemisphere Solve Anglo-Lautaro's Power Problem

Two New 9600 BHP Engines Give Modern Chilean Nitrate Corporation Total of 30,100 Nordberg Horsepower

This is the story of the modern new Diesel power plant recently completed by the Anglo-Lautaro Nitrate Corporation at Coya Sur, in the heart of their vast nitrate operations, located between the María Elena and Pedro de Valdivia plants in northern Chile.

With the experience gained through installation of a big Nordberg 7100 hp Diesel at Pedro de Valdivia, followed by two 1900 hp Nordberg Diesels at María Elena, Anglo-Lautaro engineers again turned to Nordberg for the efficient, economical solution to their power problem when additional power was needed to expand nitrate production.

The problem has been solved by two 12-cylinder Nordberg 2-cycle Diesel engines, each having a sea-level rating of 9,600 bhp, corresponding to 8,950 bhp at the installed altitude of 4,166 feet. Each engine drives a 7000 KW generator.

Employing not only two of the largest engines built in the Western Hemisphere, but the most modern concepts of power plant design and operation, the new Coya Sur Diesel plant is a striking example of the way modern industry is being served by efficient, economical Nordberg Engines.

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